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Technology Review



The Sakharov Paper

Sakharov:
Progress, Coexistence, and Intellectual Freedom

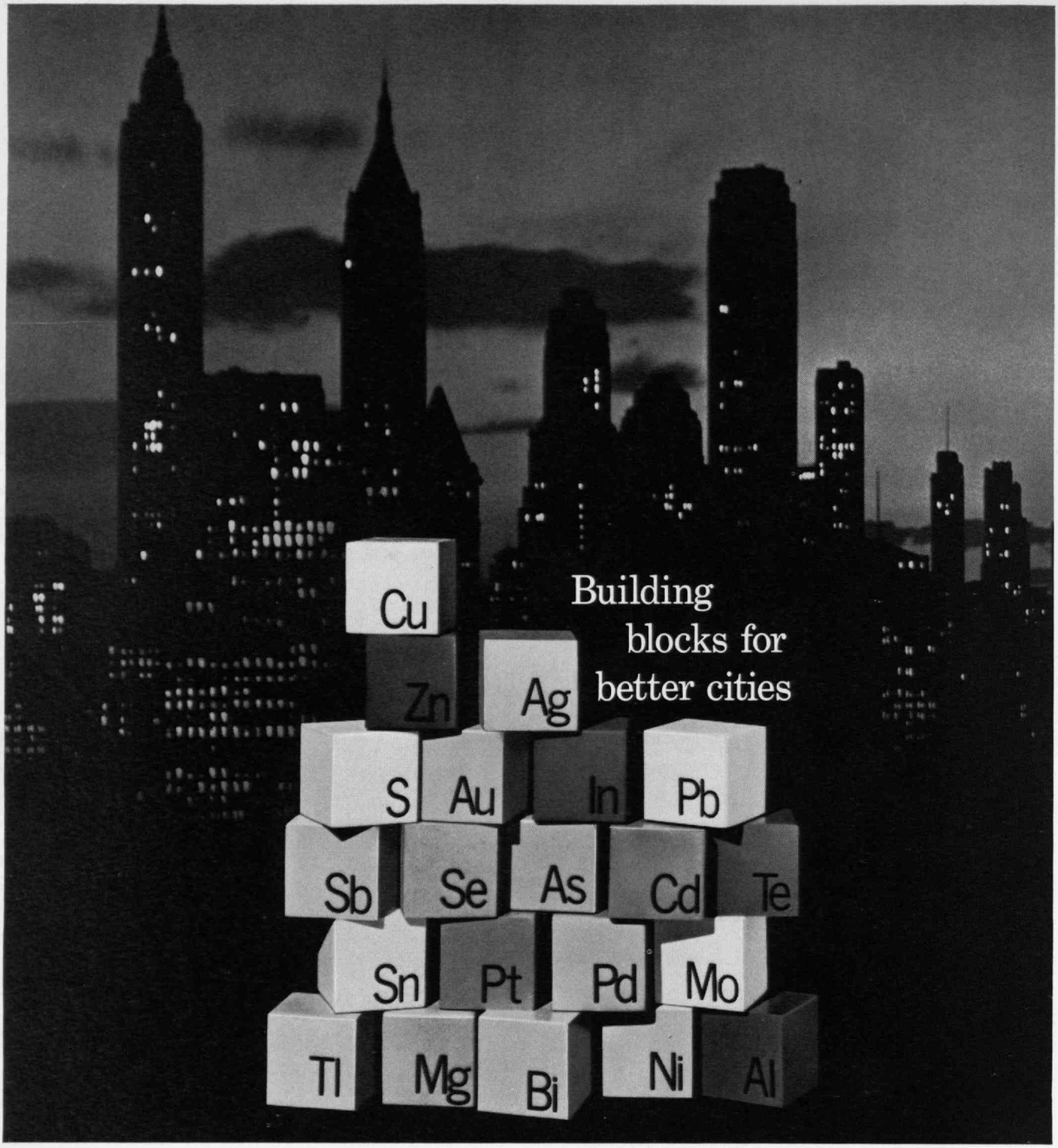
Rabi:
International Cooperation and the Perils of Science

Salisbury:
The Intelligentsia and the Universal Rights of Man

Bell:
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for
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Next Month
For mid-summer reading, *Technology Review* announces for July/August:

Alternatives for Ocean Policy
Norman Padelford

All nations must share responsibility for oceans and their resources; but how much of our sovereignty can we delegate to an international body?

Ocean Mining: Political Opportunities and Economic Consequences
David B. Brooks

How can the capital which lies in the oceans become economic as well as geological?

Lunar Photography for Apollo
George T. Keene

Even with our expressways system it is wise to travel with a good map. Here is how photography has provided one for the Apollo 11 astronauts

How Much Better Can Weather Prediction Become?
Edward N. Lorenz

Tomorrow's weather is the result of infinitely many, infinitely small details of today's weather. Long-range predictability now appears to be inherently impossible

Man-Centered Standards for Technology
John P. Eberhard

Technology today depends upon standards measured in such physical terms as meters and grams. Can we find a more human equation?

The Cover
Andrei D. Sakharov's vision is that " . . . the socialist convergence will reduce differences in social structure, promote intellectual freedom, science, and economic progress . . . an all-encompassing scientific and technological revolution, promising uncounted benefits for mankind . . . "

The design is by Ralph M. Coburn, based on a photograph in Jacques F. Ormond's *Flight* (New York: Hill and Wang, 1963).

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Technology Review

Articles

A new vision of Soviet attitudes came to the Western world in 1968 with publication in the *New York Times* of Andrei D. Sakharov's essay on "Progress, Coexistence, and Intellectual Freedom." For when Sakharov writes about ". . . an all-encompassing scientific and technological revolution, promising uncounted benefits for mankind . . . (requiring) the greatest possible scientific foresight and care and concern for human values of a moral, ethical and personal character," he departs almost wholly from the West's stereotype of the East. The essay is doubly important for *Technology Review*'s audience because it comes from a scientist and deals with the role of science in the world's great issues. Hence these contents—excerpts from the Sakharov document, two essays in response to it drawn from seminar presentations of the M.I.T. Education Research Center, and a third paper, drawn from an M.I.T. Alumni Seminar, which the editors deem to be deeply relevant to the same issues.

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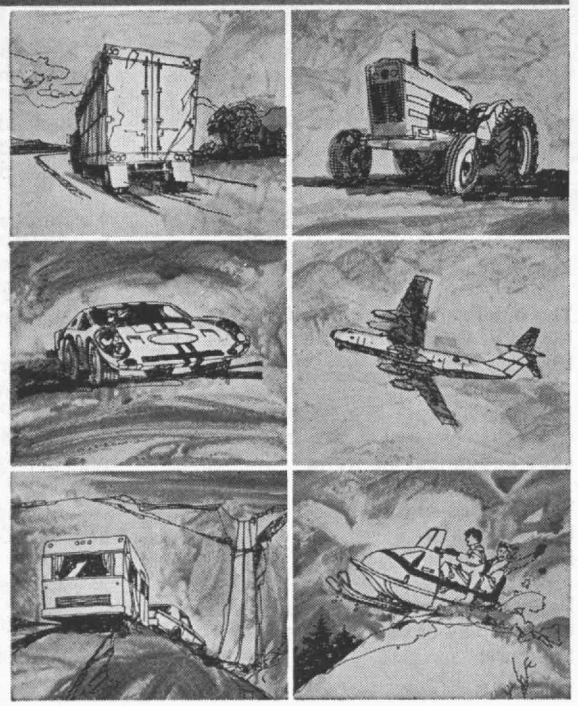
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A First Answer on Technology Assessment

How can wise, society-serving decisions be made by a committee of Congress substantially responsible for establishing policy direction for the development of U. S. science and technology?

They can't under present congressional procedures. That was the complaint of Rep. Emilio Q. Daddario of Connecticut, Chairman of the House Subcommittee on Science, Research, and Development, when, a year-and-a-half ago, he asked that something be done about it. Last month he received the first of three studies on technology assessment, each prepared in the interests of proposing more precise mechanisms for strengthening congressional methods for evaluating the impact of science and technology on the public. This first third of the response to Daddario's complaint, released as a committee print titled *Technical Information for Congress,* was prepared by the Science Policy Research Division of the Library of Congress. He expects to get the other two-thirds this month—one a study by the National Academy of Sciences, the other by the National Academy of Engineering.

In releasing the 500-page report, Daddario referred to it as a major study, "the effect of which will be a lasting one, both as a reference work of intrinsic merit and as a guide to the science policies of tomorrow." It includes 14 expertly documented case histories of major science-technology issues that have confronted Congress since World War II, and analyzes the strengths and weaknesses of congressional procedures affecting them. Among others, the cases include the battery-additive episode, Mohole, high energy physics, Camelot, the Truman Point IV program, thalidomide, and water resources management.

"Political decisions involving technology," the study states, "deal with practical and specific issues of science and government that touch on the following ten fields of concern:

1. Political identification of incompatibilities of man with his environment.
2. Determination of political goals and their relative priorities in improving man's compatibility with his environment.
3. Forecasting technology.
4. Establishing technological goals and priorities.
5. Establishing related basic and supporting research goals and priorities.
6. Applied technological system building.
7. Technological assessment.
8. Technological control.
9. Technological transfer.
10. Management of technological obsolescence.

How to Mature a Technical Issue

The study examines the critical problem of releasing time for members of Congress to enrich their understanding of a technical issue. Expanded use of computers and work-simplification surveys are considered, as well as increasing the size of congressional staff and strengthening its professional competence in technical areas and scientific disciplines.

Primary emphasis is given, however, to the need to devise ways to increase the amount of time available for the maturation of each technical issue by identifying it sooner. As the report states: "If an issue can be certified for congressional study at an early point, and surveillance maintained over it by skilled people, the process of maturation can occur without consuming congressional time and attention until the need for action is manifest. Issues might then be dealt with by the congress on an orderly time schedule, with less reliance on crash decisions and a reduced frequency of sudden sensational alarms."

The report suggests that two related services would enable members of Congress to perform more expeditiously and more confidently the task of becoming specialists to the extent necessary for the decision process on important, urgent, complex technical issues: "A useful congressional service (thereinafter referred to as "the Service") might be rendered by (a) an early warning system of the need for technical decision-making, and (b) a perfected means for supplying technical information and information sources to Congress."

For performing these needed functions, the study proposes that the Service might be given the following responsibilities:

1. Maintain a close awareness of changing U.S. social and economic conditions and goals and changing technical capabilities in order to translate these into technical goals and issues.

2. Recommend criteria to determine the relative importance and urgency of technical issues, and assist Congress by assembling and providing information indicative of the relative importance and urgency of national technical goals—those that are potentially dangerous as well as those that may be beneficent.

3. Make its own estimates of the kinds and scope of factual information likely to be needed by Congress in the political evaluation of technical goals and programs needed to preserve U.S. welfare and safety in a technological environment. Such information might include periodic tabulations of U.S. goals for basic sciences, applied sciences, and engineering technology, in physical, biological, medical, and social science fields.

4. For technical issues likely to become politically important and urgent, the Service could develop and maintain plans that could be offered for congressional investigations to analyze the issue and its implications, list salient questions to elicit needed information, abstract pertinent literature, provide rosters and biographical data about professionally qualified witnesses, and appropriate measures for gathering and analyzing technical information about the issue.

5. Respond to congressional member and committee requests for consultation and advice on the factual aspects and consequences of alternative actions relative to technical issues, and to identify persons professionally qualified to serve as witnesses or professional consultants to develop further information about each alternative.

6. Be instructed to publish from time to time concise anticipatory reports and forecasts judged helpful to inform Congress of the possible or probable emergence of a technical issue of outstanding importance in terms of potential social advantage or serious consequences.

7. Contribute professional studies and

papers to established professional media and at symposia and seminars in the U.S. and elsewhere. Arrangements might be developed for the substantial interchange of personnel between the Service and academic research activities on a temporary or loan basis in order that breadth of scope, depth of expertise, and degree of flexibility be brought to bear on all issues.

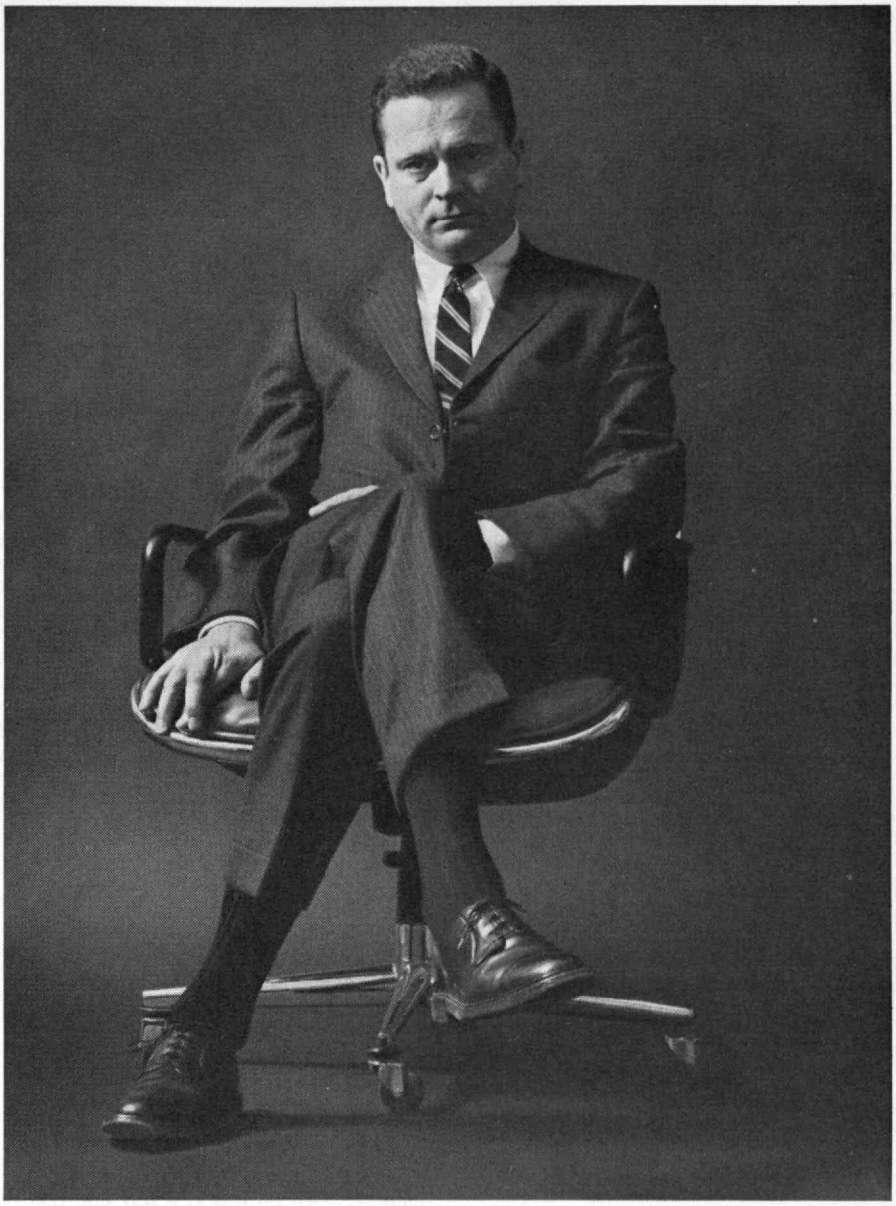
8. Periodically assess its own operation, functions, organization, and resources of personnel and information in order to report on ways to strengthen the Service to be responsive to the growing and changing needs of Congress.

A Long, Hot Summer Ahead

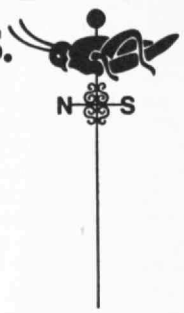
We will not know soon whether these or other devices will be set up to help assure Congress that decisions it makes will come closer to representing the best interests of the whole society. Obviously they are steps in a constructive direction. The Daddario Subcommittee awaits receipt of the Academy studies.

But its members—and competent staff—are likely to sweat through the muggy months of the Washington summer in an effort to prepare legislation to authorize support mechanisms best calculated to assure congressional awareness of and sound judgment on science-technology issues that will affect national policy. Probably hearings will be held on proposed legislation. Thereafter, a bill may be submitted to Congress. Mr. Daddario won't be able to shelve his complaint for several months.

Clyde C. Hall is a free-lance science writer based in Washington. He was formerly Public Information Officer of the National Science Foundation and was for three months late last year the Acting Managing Editor of Technology Review.



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Science and the Golden Rule

London—Faraday's ghost may rise in wrath at the suggestion, but one of his most famous aphorisms seems to be falling into disrepute.

You know the story. The Prime Minister asks Faraday what good is his experiment with electromagnetism. The physicist then flattens the politician by explaining condescendingly, "Some day you can tax it." In another version, Faraday retorts, "What good is a baby?"

The scientific community has ranked this bit of folk wisdom above practicality to justify a life of research. As the guiding star of a profession, such blind faith in the essential goodness of knowledge won't do any more. In an age when application of new knowledge often takes a nasty turn, many scientists question the guidance.

The "average man," meanwhile, eyes the man in the lab as a vaguely sinister source of changes that dehumanize the world. And students demand that scientists assume moral responsibility for what their work does to people.

Shock waves of this agitation reverberate internationally. Students occupy a laboratory for nine days at Stanford University and the Academic Senate wants to cut the university's quota of government-backed secret projects from 13 to no more than 5. Students and faculty hold an unprecedented day of soul searching at M.I.T. on March 4, and within two months the Institute orders a moratorium on new secret military projects while a committee studies the appropriateness of such research at M.I.T. (*see* Technology Review *for May, pages 68 to 71 and 80A to 80D*) And here in Britain, where there's little secret university research to question, members of the elite Royal Society join with lesser scientists and nonscientists to establish the British Society for Social Responsibility in Science (B.S.S.R.S.). While the name sounds ethereal, the action cuts squarely across the traditional ivory-towered aloofness of the British researcher.

Moving rapidly from Los Angeles to Boston to London, as I did recently, you sense the universality of the ferment. The March 4 speech at M.I.T. by Harvard's Nobel laureate George Wald is widely studied in all three research capitals. That's the speech in which he said, "The thought that we are in competition with Russians or Chinese is all a mistake and trivial. We are one species with a world to win. . . . Our challenge is what becomes of men."

This ethic of supranationalism comes naturally to members of the international fraternity of scientists. It was preached again at the inaugural meeting of the B.S.S.R.S. on April 19. Like faith in the goodness of research, it has long been professed by scientists. And, again like that faith, it is being questioned, especially by the young.

The Compromise of the Ideal

When scientists profess to do research because of the thrill of discovery, students detect that they often really are going after prestige. When scientists profess concern for humanity, students note that many of them, in fact, earn their bread on military projects.

Students who see these things are registering their protest in a way that hits scientists far harder than any laboratory sit-in. They're voting with their feet. In the United States, Britain, and several other countries, including the Soviet Union, there's a marked swing away from science among students entering universities. The drift has been so pronounced in Britain that, if continued, no one would be doing science at British universities at all by 1984. Fortunately, the drift slacked off some last year. But its significance has hit home to scientists like Professor J. Maynard Smith, biologist at the University of Sussex.

Commenting on this at the B.S.S.R.S. meeting, he observed that many young people feel science no longer answers questions which really concern them. "The reasons why I took up science no longer seem fully satisfactory," he said.

He listed these as, firstly, that many human problems, such as hunger, seem technically solvable, so as a scientist he could help mankind. Secondly, and more importantly, science satisfied him intellectually in a way no other activity did. He saw a complex world susceptible of simple explanation, as in Darwin's theory of evolution. This still is the primary reason for teaching science, he said, adding, "I'm an unashamed rationalist." But to young people, he admitted, this no longer seems enough.

And the vaunted practical benefits of research lose appeal when paired with nuclear bombs and air pollution. "Young people today are not impressed with the material benefits of science. If these are stressed, they will opt out and join the arts underground," explained M. H. F. Wilkins, Nobel Prize winning microbiologist of the University of London. The void, he said, would be filled by second-raters, leaving science in the hands of "zombies, button pushers, and yes men" who surely would turn it into a juggernaut.

How Aloof Should Science Be?

Whence came this image of the scientist as a cold experimenter unconcerned about the effects of his work? someone asked from the floor. "Oh, I think it comes partly from fact," Dr. Wilkins replied. One of the main purposes of the new society, he said, was to break down that aloofness. "It now is an open question whether doing more science is a good thing," he said. "We . . . must face the fact that science can be turned to evil as well as good." He called it "socially irresponsible" for scientists to fail to spend time considering the impact of science on society and on individuals. Science must be related to the quality of life.

In one day, this B.S.S.R.S. meeting embraced a range of thought that has unfolded in the United States over the past two decades. Other leading scientists joined Dr. Wilkins in pleading the scientist's larger responsibilities. "It's part of our business as scientists to be involved in politics . . . to see the public is informed," said Maynard Smith. It all sounded very much like positions taken a decade ago by the National Academy of Science and the American Association for the Advancement of Science. Yet for the politically disengaged British researcher, this is heady stuff.

Professor C. F. Powell, physicist at the University of Bristol, urged the fledgling

society to get into businesslike, competent investigations of the consequences of new knowledge and of technical advances whenever these seem to threaten people. The peace-shattering potential of sonic booms should have been thoroughly assessed before pushing ahead with supersonic airliners, he said. If responsible government agencies play this sort of thing down, then he would have the Society publicize the problem. He would have it lobby for reform when public policy in science or technology seems headed for disaster. Here Dr. Powell is taking a cue from the Federation of American Scientists and the (St. Louis) Citizens Committee for Scientific Information.

And, echoing an anguish expressed by many American scientists during the 1960's, some at the meeting would turn the B.S.S.R.S. into a haven for dropouts from military-oriented projects. One man told a personal tale of professional reprisal which he attributed to refusal to work on such research. Others suggested the society could both encourage such research boycotts and help their perpetrators find new jobs. This is one of the functions taken on by the so-far rather ineffective Society for Social Responsibility in Science founded several years ago in America. While they listened politely, most scientists backing the B.S.S.R.S. seemed more interested in Dr. Powell's challenge to stimulate hard thinking on some sadly neglected subjects than in providing moral support for conscientious objectors.

The international journal *Nature* was right to report that "the meeting produced a strange debate with subdued discussion and more high principle and anecdote than hard content." Certainly the group has yet to decide on its direction. But it is significant that the meeting took place at all.

"My Work and Our Inheritance"

It's Britain's counterpart to M.I.T.'s March 4. It expressed the same concern for the ends to which science is put, the same concern for the mindless ways in which technology transforms our world.

Here too, prominent "establishment-type" scientists reached out to students and even to the general public in a mutual search for enlightment. One woman, obviously no scientist, pointedly reminded the group of the need for this reaching out. "How many ordinary people have been in here?" she demanded, indicating the plush hall of the Royal Society which was rented for the occasion. "Many ordinary scientists have never been inside this hall," replied S. P. Rose of Imperial College, session chairman, "and if the society can make the Royal Society a more open society, they would regard it as a good thing."

The thought currents agitating the scientific community run deep. Defense-related research, especially at American universities, is only the first established pattern to be undermined as scientists analyze what M.I.T. physicist Francis Low calls "misuses (of science and technology) that threaten our survival." When challenged to justify their work, it's not enough for scientists to ask rhetorically "What good is a baby?" They must also ask "How will my work affect the world our babies inherit?"

If Faraday's ghost resents my reporting this, it knows where to find me, for I'm writing this within a few blocks of his grave. But I suspect the great Nineteenth Century experimenter would be pleased to know his intellectual descendants are beginning to put the Golden Rule before Faraday's rule in assessing the relevance of the work to mankind.

Robert C. Cowen, who studied meteorology at M.I.T., is Science Editor of The Christian Science Monitor *currently stationed in London; he is a past President of the National Association of Science Writers.*

Germany Up, Britain Down

West Germany and Great Britain today provide distinct contrasts in national policy toward big technology. Germany, with its booming economy and increasing political confidence, is opting for the costly projects that, whatever their technical or economic value, have come to be regarded as the hallmark of a significant national power. Britain, on the other hand, with its weak economy and declining political confidence, is striving to cut its losses, or at least hold down costs, in many of the very same fields into which the Germans are currently plunging.

It is fair to note, though, that the British policy proceeds from a well-established and relatively well-funded scientific and technological base, whereas the Germans are still building up from a level that was quite low just five or six years ago. With a 1967 gross national product of $121 billion, the Germans were spending less than 2.5 per cent on research and development; the British, with a G.N.P. of $109 billion, have generally hovered around the 3 per cent mark. It is also worth noting that the British devote around one-third of their research and development funds to military purposes, while the Germans devote only about one-tenth to this area. In any case, trends make history, and the German trend is rapidly upward while the British trend is only slightly upward.

Parallels and Contrasts

Examples are easy to find. Within the past year, Britain decided against joining in the construction of the 300 GeV accelerator planned by the European Center for Nuclear Research (CERN). The British agree that the machine is scientifically meritorious and deserves to be built; but the government explains that for reasons of economy, Britain cannot take part. In an effort to persuade their government to reverse its decision on CERN, British scientific leaders have been hinting that at least one national accelerator might be cut back in operations to release funds for the CERN project. Germany, however, has not wavered in its support; indeed, the Germans, in contrast, are not only backing CERN but are also going ahead with an ambitious national program.

Europe's faltering space program provides another example of the Anglo-German contrast. With costs characteristically rising far beyond the original estimates, Britain has repeatedly sought to be relieved of its commitment to contribute heavily to the development of a European launch vehicle. It has argued, and with a fair amount of plausibility, that the project has gone so awry that launchers should for reasons of economy be purchased from the United States and the savings put into commercially attractive space ventures, particularly satellite communications. Germany did not dispute the economics of the case. Rather, it looked to the politics and prestige of the matter and came out victorious with the argument that Europe's access to space should not be contingent on American good will.

In aviation, the British government recently dropped out of a three-way partnership with France and Germany for development of an "air bus." The rationale was a sensible one: no customers are in sight for the costly venture; further, the British Aircraft Corporation is well along on its own with designs for a less expensive, commercially attractive aircraft of similar capability. Germany and France, however, decided to go ahead on the grounds that, with or without foreseeable sales, they want to remain in the vanguard of commercial aviation.

In oceanography, the British and German programs are relatively small when viewed on the American scale. Thus, the British spend about $33 million a year, approximately half of which comes through the Ministry of Defense. The Germans spend about $9 million annually, little of which has a military source. But, whereas Germany has announced that it will more than double its oceanographic program by 1972, a high-level British study—to the despair of many British oceanographers—recently concluded that the existing program is more or less satisfactory.

Economics in Control

In Britain's case, simple economics provide most of the explanation for the decisions cited above. In Germany's case, the decision-making process is governed by economics and politics.

With an adverse balance of payments sapping the economy, Britain is determined to place its technological bets on paying propositions—especially when foreign expenditures are involved—rather than on projects for which the ethereal argument of "prestige" must be invoked. True, Britain remains in the exorbitantly expensive and commercially dubious Concorde supersonic transport project with France. But that venture pre-dates the present government, and at various points along the way, as costs multiplied far beyond the original estimates, Britain sought to get out—only to be reminded by the prestige-conscious French that the Concorde agreement allows no unilateral withdrawal. In fact, it has been strongly hinted that if Britain reneged on the agreement, France would take her to the International Court at the Hague and seek damages that might make the Concorde bill look relatively cheap.

But Britain does want to remain technologically dynamic, and, in addition, recognizes that technological cooperation helps improve the prospects for her long-frustrated efforts to enter the Common Market. Under such circumstances, she has had to pick and choose among various possibilities, and the guiding star has become economic payoff. Thus she turns down the CERN venture but readily joins Germany and Holland in a plan to construct two centrifuge plants for uranium enrichment, on the grounds that, commercially, it looks like a promising venture. Again, while backing away from high-energy physics, she continues to invest heavily in atomic energy, on the basis of commercial prospects. And it is reasonable to assume that, for the long run, she will be orienting her space activities toward applications programs, though the scientific side of her space program has been accorded a respectable level of support.

At this point, radio astronomy is perhaps the only "big science" field in which the invocation of "prestige" carries much weight. Britain pioneered in the development of big dishes and has reaped great favorable attention, both scientifically and from the general public, for her excellence. Though some programs have been stretched out, pride in this field is such that radio astronomy receives generally loving treatment.

Germany: the Politics of Science

Germany's policies toward big technology flow, first of all, from her strong economic position. Money is not the governing factor when it comes to choosing among various possibilities. Rather, with money in ample supply, political preference can be accorded significant weight, and the preference of Germany, faced by hostility from the east, is to link herself as tightly as she can to the west. Thus there has scarcely been any proposition for European technological cooperation which has not drawn enthusiastic German support—and offers of cash.

This politically motivated desire to work with other nations has had a strong feedback effect on the status of German science at home. Recognizing that access to foreign-based facilities is likely to promote a "brain drain" unless the access stems from a strong home base, the Germans have been investing heavily in making the homeland attractive for their scientists and engineers as a professional home base. Salaries, though improving, are still lagging; and some foreign-based facilities, such as upper high-range accelerators, have no home equivalent. But in its affluence-based plunge into big science and technology, Germany is wisely tempering its political strategy with a recognition that excellence, even if it does not begin at home, should be induced to keep close ties to home.

The contrast between Britain and Germany is striking. Basically it comes down to the fact that the Germans are on the way up and feel and act accordingly, whereas the British feel a weariness and doubt that shows up strongly in their assessment of where to go in big science and technology.

Daniel S. Greenberg is stationed in London as Foreign Editor of Science, *the weekly journal of the American Association for the Advancement of Science.*



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The Sonnet and the Button

Machina Ex Deo: Essays in the Dynamism of Western Culture
Lynn White, Jr.
Cambridge: M.I.T. Press, 186 pp., $5.95

In the growth of cultures, as of individuals, remnants of the past, submerged beyond the ordinary reach of memory, create inconsistencies of attitude and action in the present. The contradictions are most apparent when they concern the central issues and phenomena of the times. In contemporary Western culture, the major forces determining how—and perhaps whether—people live originate in science and technology. The fact is hardly questioned, certainly not by humanists. Yet, paradoxically, to speak of the humanities is to exclude by definition both science and engineering, as if they were unrelated to human purposes.

Or consider the sonnet and the button. Lynn White, Jr., notes in *Machina Ex Deo: Essays in the Dynamism of Western Culture* that they were invented in thirteenth-century Europe. And he adds that " . . . we value the sonnet but think that a button is just a button." Without indulging in C. P. Snow-ish challenges to the "other" culture, it is appropriate to point out that the idea of the button is far from obvious (it did not occur to Oriental civilizations: the Portuguese brought it to Japan, while the Chinese never adopted it); that the invention of the button, like the invention of the sonnet, was a creative act—though requiring different talents; that the button possesses a distinctive esthetic quality arising from the harmony of its form and function; and that it serves with great efficiency an eminently human purpose. Having said all this, it is nevertheless difficult to subdue a spontaneous, uncensored judgment that the sonnet is a superior achievement, somehow more characteristically human than the button. At the same time, we may recognize intuitively that this conclusion is a surviving fragment of a system of values no longer universally applicable.

Broader New Canons for Today
In his book, Professor White explores the sources and implications of such judgments in the world today. His field is not modern history—he is Director of the Center for Medieval and Renaissance Studies at U.C.L.A.—but he establishes his credentials in a sentence that might well be carved on the walls of many institutions. "Knowledge of history," he says, "frees us to be contemporary."

For more than 2,000 years, the Greek mode of thought has provided the basis for many aspects of Western culture, including drama, philosophy, and mathematics, as well as criteria for individual and social behavior. In recent times, Professor White believes, fundamental standards have begun to change. He emphasizes that the old canons are not, and should not, be discarded but rather incorporated into the broader new canons.

The *canon of the Occident,* which originated in Athens, "the first consciously Occidental society," is displaced by the *canon of the globe.* Not only saki, *go,* and hibachis are imported, but also ideas and philosophies as specifically Oriental as Zen Buddhism.

The *canon of logic and language* is expanded to the *canon of symbols.* The validity of logic and language as instruments of thought and expression is not denied, but their uniqueness disappears. They are seen as two among many other symbolic instruments, such as painting, music, the dance, mythology, the theater.

The *canon of rationality,* gives way to the *canon of the unconscious.* Reason is no longer considered the highest quality of the mind, without which humanness does not exist. The mind, it is realized, is more than reason, it is multilayered, with hidden depths.

The *canon of the hierarchy of values* becomes the *canon of the spectrum of values.* For the view that some human activities are more rewarding intellectually and spiritually than others is substituted the belief that every human activity has the potentiality of greatness and bears the promise of reward. " 'What is the Buddha?' asked the Zen novice. 'Three pounds of rice,' replied the abbot."

We can see that some changes are taking place. It is not clear, however, that the rate of extent of change is significant. The four new canons are in essence two. One unites Western with Oriental and, perhaps ultimately, African culture (the *canon of the globe* and the *canon of the spectrum of values*), while the other places logic and reason in the broader context of generalized symbolic languages (the *canon of symbols* and the *canon of the unconscious*). The first of these two sets of canons appears to be enjoying a commercial and intellectual vogue. The second, more firmly based in philosophical and psychological studies, is likely to have longer lasting effects.

Increasing the Dignity of Labor
But we should not rush in where historians fear to tread. It is less fruitful to speculate about the future than to consider changes that have taken place in the past.

In the Greek hierarchy of values, activities of the mind occupied the highest place. Work with the hands was demeaning in a society that rested on the labor of slaves. To build a model for geometrical problems contaminated pure thought and was contemptible. Archimedes, we are told, was apologetic about the machines he designed. Inventions were made by slaves; culture and the liberal arts were the prerequisites of aristocracy.

The reversal of the classical attitude toward manual labor began with the Benedictine monks, who were required to work in fields and shops. While the dignity of labor and the self-respect of the laborer gradually increased, the idea that work with the hands was as much a part of the good life as work with the brain made slow progress. It was not until a tradition of learning and a tradition of labor developed in the same individuals that the explosive outburst of scientific and technological creativity could occur.

The technological revolution was also inevitably a democratic revolution, Professor White notes repeatedly. The newly created man, the engineer, did what the aristocrat would not, thereby accomplishing what the aristocrat could not. He changed the material conditions of living, and in so doing, changed the nature of society.

It is evident from the parable of the

sonnet and the button, however, that there still exist hidden connections between us and antiquity.

Ecological Crisis in Linear View

The Greek mode of thought has been supplanted in another respect. When the Greek philosophers speculated about the nature of time, they generally saw the time-process as cyclical, a view also common to many oriental religions. History, the acount of events occurring in time, therefore consisted of a repetitive series of cycles. What was will be again and again forever, since time has no beginning and no end.

The Judeo-Christian view of time is linear. "In the beginning God created the heaven and the earth." Time has a beginning and a direction, so that the concept of progress is possible. Moreover, time is irreversible and history is unique, an essential requirement for religions in which ethical decisions for action must be made and ultimate judgment is promised. Adam was created only once, not a second or a third or a hundredth time in some cosmic cycle. Only once did Moses lead the children of Israel out of Egypt, Jesus lived and died only once, and only once, at the very end, there will be a Last Judgment.

Professor White does not dwell in such rarefied regions without remembering his responsibilities as a historian. He demonstrates convincingly how the linear view of time is related to one of the most serious of contemporary problems, the ecological crisis.

In antiquity man was a part of nature, living and working according to the cycles of the seasons. What he took from nature was limited by his needs and his unaided strength. His capacity to do damage was inhibited by the animism that required him to placate the guardian spirit in every natural object.

The concept of linear time is associated with a story of creation that placed man in a universe created for his benefit and gave him dominance over everything in it. Man, being made in God's image, ceased to be a part of nature but transcended it, to become instead the exploiter of nature. Even the protection of guardian spirits was lost, with the destruction of pagan animism.

The technological changes that began about 1000 A.D., when water power was applied to industrial processes, multiplied man's potential for exploitation and foreshadowed the coming disruption of the natural order. By 1285 London air was acrid with smog from the burning of soft coal. When finally, about 100 years ago, there was a sudden union of science and technology—that is, of the theoretical and the empirical, of brain and hand—resulting in the technological-democratic revolution, the extent of the coming ecological crisis was all but determined.

No solution so far proposed, whether smoke control, banning DDT, or sending contraceptives to overpopulated countries, seems more than partial. Professor White doubts that applying more science and more technology to the problems will be effective. "What we do about ecology depends on our ideas of the man-nature relationship. . . . Since the roots of our trouble are so largely religious, the remedy must also be essentially religious, whether we call it that or not."

Engineers for a New Humanism

Professor White is concerned about the democratic revolution and the survival of democracy; therefore he is concerned about science and technology, about scientists and engineers. At times, when his feelings overflow, he writes in a manner to make the more modest ask, blushing, "Who, me?"

"Engineers are, and always have been, implicitly dedicated to the liberation of mankind from the limitations of the physical world. . . . Engineers are the chief revolutionaries of our time. Their implicit ideology is a compound of compassion for those suffering from physical want, combined with a Promethean rebellion against all bonds, even bonds to this planet."

All the same, he assigns to them responsibilities that many, if not most, engineers do not yet recognize. The chief of these is to make their activities understandable to others, as well as to themselves; to learn how technology is involved in "the general philosophical, artistic, religious, political, economic, and social milieus"; that is, to be concerned with their own ecology. The means by which they can do this is the study of the history of technology and science, which can open for them "a portal to the exploration of the human spirit."

Professor White's fervor arouses a degree of uneasiness. The technological revolution indisputably coincided with the democratic revolution. It is probably true that ". . . by the nature of their activity, engineers have largely destroyed the contemporary validity of the older aristocratic humanism which was a cultural weapon in the hands of the ruling class." There is no necessary continuing relation, however, between technology and democracy. It is conceivable, in fact, that under some not too unlikely conditions an engineering subculture might evolve into a new aristocracy.

Perhaps the key is understanding and communication, so that "when engineers . . . come to know explicitly what they are doing, when they recognize their dedication, they can join with alert humanists to shape a new humanism which will speak for and to a global democratic culture."

In Brief

In *Biography: The Craft and the Calling* (Boston: Atlantic-Little Brown, 174 pp., $5.95) Catherine Drinker Bowen, as if following Professor White's injunction to engineers, examines the nature of her work. She is the author of seven biographies, the best known of which are probably those of Tchaikovsky, Justice Holmes and Sir Edward Coke, so that she finds no lack of illustrations from her own books. A potential reader of biography will learn with pleasure "how a writer puts a book together, the problem of setting it on paper economically, vividly, with clarity and narrative continuity." It would not surprise me if the book also served as a working guide for potential writers of biography.

The Shepherd of the Ocean (Boston: Gambit, 464 pp., $8.95) by J. H. Adamson and H. F. Folland is a biography of Sir Walter Ralegh. In West Country dialect, his name was pronounced Watar, which suggested to Queen Elizabeth the pun that is the book's title.

Ralegh was a soldier, a poet, a colonizer, adviser to the Queen, a historian, and a man who strove to be a hero. His fortunes, political and financial, rose and fell all his life. Toward the end, he was prosecuted on a flimsy charge of treason. (The Crown's Attorney-General was Sir Edward Coke, whose story Mrs. Bowen has told from another point of view.) For 15 years, he was prisoner in the Tower of London, where he wrote his ambitious History of the World, until finally he was executed.

The authors' interest in the Elizabethans and their times adds to the fullness of their portrait of Ralegh.

New from the M.I.T. Community

American Power and the New Mandarins, Noam Chomsky, Ward Professor of Modern Languages and Linguistics, M.I.T. New York: Pantheon Books, $7.95. Drawn from writings in *Ramparts, New York Review of Books, Liberation,* and *Harvard Education Review,* this argument focuses on what Professor Chomsky sees as a growing and inappropriate concentration on ability rather than moral purpose in American affairs.

Urban Dynamics, Jay W. Forrester, (M.I.T. S.M.'45), Professor of Management. Cambridge and London: The M.I.T. Press, $12.50. An account of the development of a dynamic model, or theory, of the processes that affect the life and decay of cities. (*See* Technology Review *for April, 1969, pages 21-31.)*

War, Peace, and the Viet Cong, Douglas Pike. Cambridge and London: The M.I.T. Press, $5.95. A review of the major contenders in the Vietnam hostilities, their objectives, their real desires, and their stated demands, suggesting possible outcomes of the present war.

Joseph Mindel is a member of the M.I.T. Lincoln Laboratory. The notes "New from the M.I.T. Community" have been prepared by the editors of Technology Review.

The Sciences of the Artificial *by Herbert A. Simon*
The Sciences of the Artificial reveals the design of an intellectual structure aimed at accommodating those empirical phenomena that are "artificial" rather than "natural." The goal is to show how empirical sciences of artificial systems are possible, even in the face of the contingent and teleological character of the phenomena, their attributes of choice and purpose. Developing in some detail two specific examples — human psychology and engineering design — Professor Simon describes the shape of these sciences as they are emerging from developments of the past 25 years.

Beyond his specific examples, the author indicates how the sciences of the artificial are relevant to economics, management and administration, medicine, education, architecture, art . . . to all fields that create designs to perform tasks or fulfill goals and functions. *The 1968 Karl Taylor Compton Lectures* **$5.95**

The Mathematical Sciences: A Collection of Essays *edited by COSRIMS*
Twenty-one noted mathematical scientists address themselves here to the large and growing audience of curious and thoughtful readers, including those without formal training in the higher reaches of mathematics and those who believe they may have forgotten what they once knew. Some of the contributors describe striking developments and achievements in contemporary mathematics; others concentrate on the myriad applications of mathematics to other fields.

The book was prepared by the Committee on Support of Research in the Mathematical Sciences (COSRIMS) for the National Academy of Sciences as part of an effort to gauge the present status and envision the future needs and directions of the mathematical sciences in the United States.

The distinguished contributors: Stanislaw Ulam, Lipman Bers, John G. Kemeny, Joshua Lederberg, H. S. M. Coxeter, J. Kiefer, J. T. Schwartz, J. J. McShane, Freeman J. Dyson, A. S. Wightman, Philip J. Davis, George E. Forsythe, Samuel Eilenberg, Lawrence R. Klein, Andrew M. Gleason, Zellig Harris, Gian-Carlo Rota, R. H. Bing, Hirsh Cohen, Mark Kac, and Raymond Smullyan. **$8.95**

Machina ex Deo: Essays in the Dynamism of Western Culture *by Lynn White, Jr.*
A renowned medievalist joins a humanizing grace with insight in these studies in the history of technology and culture. Many discussions of technology treat it as though it were an autonomous force, independent of its context. White shows that for a millennium it has been an integral and major activity of the West, fostered and shaped by other forms of culture and reciprocally affecting them. He is concerned to bridge the present gap between the thinking of the engineers and that of the humanists — a mutual alienation that he considers historically unjustifiable.

Although the cleavages of change, technological and social, have indeed alienated man from his proper past in a significant way, certain indissoluble continuities survive. That engineering and science have their roots in the Greco-Roman world is well known. But that our present science and technology grew directly out of the Judeo-Christian view of reality as it developed in the Middle Ages is still not widely recognized. Tracing this continuity is one of White's major themes, persuasively developed. **$5.95**

Force and Folly: Essays on Foreign Affairs and the History of Ideas *by Hans Speier*
Most of the papers collected here were written in the last ten years, and the book may be regarded as a sequel to the author's *Social Order and the Risks of War: Papers in Political Sociology,* first published in 1952 and reissued by The M.I.T. Press in 1964. The papers in *Force and Folly* reflect Hans Speier's professional concerns over the past decade as a charter member of the Research Council of The RAND Corporation. About a third of the papers have never been published before in any form.

"Force" and "Folly" are respectively the titles of the book's two parts. Speier explicitly warns against misreading his title as *Force is Folly:* The first paper, "War and Peace in the Nuclear Age," makes clear that he does not believe war to be abolishable in the foreseeable future, although we may hope to keep it scaled down to appropriately chosen limits; that the use of force is often unavoidable and sometimes justifiable; but that the use of *total* force is indeed gross folly. **$12.50**

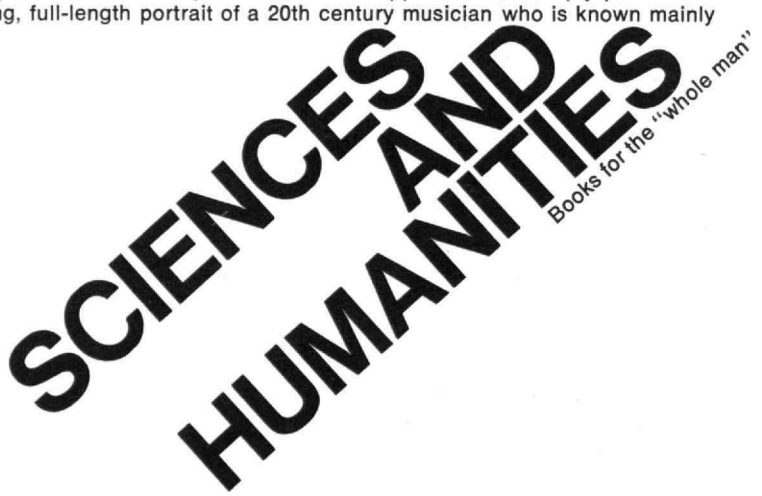
Molecular Biology: A Structural Approach *by C. U. M. Smith*
C. U. M. Smith's new book is an exceptionally lucid exposition of molecular biology intended for the scientifically orientated general reader as well as high-school students and college freshmen planning to study one of the biological sciences. It is based in conception on the author's earlier volume on the same subject — *The Architecture of the Body,* an account of molecular biology as it existed towards the end of 1961. The present volume includes the latest advances in this field up to the middle of 1967. Not only has the text been rewritten, but the material has been treated in greater depth and in particular the sections on the structure of protein molecules and on molecular genetics have been considerably enlarged. **$12.50**

Erik Satie *by Pierre-Daniel Templier, Translated by Elena L. and David S. French*
Charges of dilettantism and eccentricity have long obscured the authentic character of Erik Satie and his works. In this intimate, farsighted biography by Templier, based largely on original sources and published in France in 1932, Satie emerges as a rare and gifted musician, misunderstood and underestimated because of a complex personality. His "oddness" is revealed as a mask for a stoical independence of spirit coupled with an unusual, childlike innocence which set him apart from more sophisticated, "success-oriented" peers.

Templier's discerning study of this sensitive and perceptive musician was long out of print and until this translation was practically unattainable.

The biography is written in a sincere, straightforward style, somewhat comparable to the "stripped-down," deeply personal quality of Satie's works. It creates a significant, convincing, full-length portrait of a 20th century musician who is known mainly only in profile and caricature. **$6.95**

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The Sakharov Paper

An introduction by the Editors of
Technology Review

On July 22, 1968, the New York Times *surprised and indeed puzzled many of its readers by devoting more than a full page to the text of an essay by a little-known if highly respected Russian physicist, Andrei D. Sakharov. Some months later the same text, with helpful annotations by Harrison E. Salisbury, Assistant Managing Editor of the* Times, *appeared in book form under the imprint of W. W. Norton and Company, Inc.* (Progress, Coexistence, and Intellectual Freedom *by Andrei D. Sakharov, 158 pp., $3.95).*

Since then, the emphasis given this document in the Times *has become amply justified. For Andrei Sakharov's paper has made it clear that Russian scientists are concerned—and deeply so—about the same issues as American scientists; that they see, as do we, the necessity for a common dialogue toward a common purpose. As Mr. Salisbury wrote in his introduction, "The American nuclear scientists have long presented the future in terms of a symbolic clock, the hands of which stand at a few minutes to midnight, the hour at which the world destroys itself. Sakharov tells time by the same clock. From the sense of urgency which this clock imparts he derives his concept of a world society in which the peril point may be permanently stayed."*

The discussion provoked by the publication of this document in the U.S.—it has never been generally published in Russia—continues. In this issue Technology Review *attempts a response for the M.I.T. community—two essays, by Isidor I. Rabi and Harrison Salisbury, based on their seminar discussions of the Sakharov paper at M.I.T.; and a paper in which Daniel Bell of Columbia University traced for the 1968 M.I.T. Alumni Seminar what may be seen as an American view of the issues of social organization and method to which Sakharov, too, addressed himself.*

The difficulty in bringing Sakharov's essay to a wider audience is that so little is generally known in the West about recent Soviet history and thinking—and so much that is not true is assumed. The average Westerner must make a considerable imaginative effort to place himself in the position of a Russian "concerned scientist" in a period of intense political re-thinking, to discard some of his American misconceptions of the conditions of life and thought in the Soviet Union. It is this background to which Mr. Salisbury addresses himself in this issue of the Review.

It follows that the essay cannot easily be summarized. It should be read in full; as M.I.T.'s Professor Jerrold R. Zacharias has said, "the Sakharov paper . . . should be the basis of a seminar in every college and university in the country." Yet for the benefit of the Review's *readers who have no other acquaintance with the document, a summary is necessary. What follows is a selection of passages drawn from* Progress, Coexistence and Intellectual Freedom,* *chosen because they at least partially summarize the scope and substance of Sakharov's argument.*

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Excerpts from the essay by "the 'father' of the Russian hydrogen bomb"

Andrei D. Sakharov

Progress, Coexistence, and Intellectual Freedom

General Statement

The views of the author were formed in the milieu of the scientific and scientific-technological intelligentsia, which manifests much anxiety over the principles and specific aspects of foreign and domestic policy and over the future of mankind. This anxiety is nourished, in particular, by a realization that the scientific method of directing policy, the economy, arts, education, and military affairs still has not become a reality.

We regard as "scientific" a method based on deep analysis of facts, theories, and views, presupposing unprejudiced, unfearing open discussion and conclusions. The complexity and diversity of all the phenomena of modern life, the great possibilities and dangers linked with the scientific-technical revolution and with a number of social tendencies demand precisely such an approach, as has been acknowledged in a number of official statements.

In this essay, advanced for discussion, the author has set himself the goal to present, with the greatest conviction and frankness, two theses that are supported by many people in the world. The theses relate to the destruction threatened by the division of mankind and the need for intellectual freedom.

1. The division of mankind threatens it with destruction. Civilization is imperiled by: a universal thermonuclear war, catastrophic hunger for most of mankind, stupefaction from the narcotic of "mass culture," and bureaucratized dogmatism, a spreading of mass myths that put entire peoples and continents under the power of cruel and treacherous demagogues, and destruction or degeneration from the unforeseeable consequences of swift changes in the conditions of life on our planet.

In the face of these perils, any action increasing the division of mankind, any preaching of the incompatibility of world ideologies and nations is madness and a crime. Only universal cooperation under conditions of intellectual freedom and the lofty moral ideals of socialism and labor, accompanied by the elimination of dogmatism and pressures of the concealed interests of ruling classes, will preserve civilization.

The reader will understand that ideological collaboration cannot apply to those fanatical, sectarian, and extremist ideologies that reject all possibility of rapprochement, discussion, and compromise, for example, and ideologies of Fascist, racist, militaristic, and Maoist demagogy.

Millions of people throughout the world are striving to put an end to poverty. They despise oppression, dogmatism, and demagogy (and their more extreme manifestations—racism, Fascism, Stalinism, and Maoism). They believe in progress based on the use, under conditions of social justice and intellectual freedom, of all the positive experience accumulated by mankind.

2. The second basic thesis is that intellectual freedom is essential to human society—freedom to obtain and distribute information, freedom for open-minded and unfearing debate and freedom from pressure by officialdom and prejudices. Such a trinity of freedom of thought is the only guarantee against an infection of people by mass myths, which, in the hands of treacherous hypocrites and demagogues, can be transformed into bloody dictatorship. Freedom of thought is the only guarantee of the feasibility of a scientific democratic approach to politics, economy, and culture.

But freedom of thought is under a triple threat in modern society—from the opium of mass culture, from cowardly, egotistic and narrow-minded ideologies, and from the ossified dogmatism of a bureaucratic oligarchy and its favorite weapon, ideological censorship. Therefore, freedom of thought requires the defense of all thinking and honest people. This is a mission not only for the intelligentsia but for all strata of society, particu-

larly its most active and organized stratum, the working class. The worldwide dangers of war, famine, cults of personality, and bureaucracy—these are perils for all of mankind.

Recognition by the working class and the intelligentsia of their common interests has been a striking phenomenon of the present day. The most progressive, internationalist, and dedicated element of the intelligentsia is, in essence, part of the working class, and the most advanced, educated, internationalist, and broad-minded part of the working class is part of the intelligentsia.

This position of the intelligentsia in society renders senseless any loud demands that the intelligentsia subordinate its strivings to the will and interests of the working class (in the Soviet Union, Poland, and other socialist countries). What these demands really mean is subordination to the will of the party or, even more specifically, to the party's central apparatus and its officials. Who will guarantee that these officials always express the genuine interests of the working class as a whole and the genuine interests of progress rather than their own caste interests?

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Dangers:

1. The Threat of Nuclear War

Every rational creature, finding itself on the brink of a disaster, first tries to get away from the brink and only then does it think about the satisfaction of its other needs. If mankind is to get away from the brink, it must overcome its divisions.

A vital step would be a review of the traditional method of international affairs, which may be termed "empirical-competitive." In the simplest definition, this is a method aiming at maximum improvement of one's position everywhere possible and, simultaneously, a method of causing maximum unpleasantness to opposing forces without consideration of common welfare and common interests.

If politics were a game of two gamblers, then this would be the only possible method. But where does such a method lead in the present unprecedented situation?

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2. International Tensions and New Principles

The international policies of the world's two leading superpowers (the United States and the Soviet Union) must be based on a universal acceptance of unified and general principles, which we initially would formulate as follows:

1. All peoples have the right to decide their own fate with a free expression of will. This right is guaranteed by international control over observance by all governments of the "Declaration of the Rights of Man." International control presupposes the use of economic sanctions as well as the use of military forces of the United Nations in defense of "the rights of man."

2. All military and military-economic forms of export of revolution and counterrevolution are illegal and are tantamount to aggressions.

3. All countries strive toward mutual help in economic, cultural, and general-organizational problems with the aim of eliminating painlessly all domestic and international difficulties and preventing a sharpening of international tensions and a strengthening of the forces of reaction.

4. International policy does not aim at exploiting local, specific conditions to widen zones of influence and create difficulties for another country. The goal of international policy is to insure universal fulfillment of the "Declaration of the Rights of Man" and to prevent a sharpening of international tensions and a strengthening of militarist and nationalist tendencies.

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3. Hunger and Overpopulation

Specialists are paying attention to a growing threat of hunger in the poorer half of the world. Although the 50 per cent increase of the world's population in the last 30 years has been accompanied by a 70 per cent increase in food production, the balance in the poorer half of the world has been unfavorable. The situation in India, Indonesia, in a number of countries of Latin America, and in a large number of other underdeveloped countries—the absence of technical-economic reserves, competent officials, and cultural skills, social backwardness, a high birthrate—all this systematically worsens the food balance and without doubt will continue to worsen it in the coming years.

The answer would be a wide application of fertilizers, an improvement of irrigation systems, better farm technology, wider use of the resources of the oceans, and a gradual perfection of the production, already technically feasible, of synthetic foods, primarily amino acids. However, this is all fine for the rich nations. In the more backward countries, it is apparent from an analysis of the situation and existing trends that an improvement cannot be achieved in the near future, before the expected date of tragedy, 1975-80.

What is involved is a prognosticated deterioration of the average food balance in which localized food crises merge into a sea of hunger, intolerable suffering and desperation, the grief and fury of millions of people. This is a tragic threat to all mankind. A catastrophe of such dimension cannot but have profound consequences for the entire world and for every human being. It will provoke a wave of wars and hatred, a decline of standards of living throughout the world, and will leave a tragic, cynical, and anti-Communist mark on the life of future generations.

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It is apparently futile only to insist that the more backward countries restrict their birthrates. What is needed most of all is economic and technical assistance to these countries. This assistance must be of such scale and generosity that it is absolutely impossible before the estrangement in the world and the egotistical, narrow-minded approach to relations between nations and races is eliminated. It is impossible as long as the United States and the Soviet Union, the world's two great superpowers, look upon each other as rivals and opponents.

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In the opinion of the author, a fifteen-year tax equal to 20 per cent of national incomes must be imposed on developed nations. The imposition of such a tax would automatically lead to a significant reduction in expenditures for weapons. Such common assistance would have an important effect—that of stabilizing and improving the situation in the most underdeveloped countries, restricting the influence of extremists of all types.

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4. Police Dictatorships

An extreme reflection of the dangers confronting modern social development is the growth of racism, nationalism, and militarism and, in particular, the rise of demagogic, hypocritical, and monstrously cruel dictatorial police regimes. Foremost are the regimes of Stalin, Hitler, and Mao Tse-tung, and a number of extremely reactionary regimes in smaller countries, such as Spain, Portugal, South Africa, Greece, Albania, Haiti, and other Latin-American countries.

These tragic developments have always derived from the struggle of egotistical and group interests, the struggle for unlimited power, suppression of intellectual freedom, a spread of intellectually simplified, narrow-minded mass myths (the myth of race, of land and blood, the myth about the Jewish danger, anti-intellectualism, the concept of *lebensraum* in Germany, the myth about the sharp-

ening of the class struggle and proletarian infallibility bolstered by the cult of Stalin and by exaggeration of the contradictions with capitalism in the Soviet Union, the myth about Mao Tse-tung, extreme Chinese nationalism and the resurrection of the *lebensraum* concept, of anti-intellectualism, extreme antihumanism, and certain prejudices of peasant socialism in China).

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Our country has started on the path of cleansing away the foulness of Stalinism. "We are squeezing the slave out of ourselves drop by drop" (an expression of Anton Chekhov). We are learning to express our opinions, without taking the lead from the bosses and without fearing for our lives.

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5. The Threat to Intellectual Freedom

Nothing threatens freedom of the personality and the meaning of life like war, poverty, terror. But there are also indirect and only slightly more remote dangers.

One of these is the stupefaction of man (the "gray mass," to use the cynical term of bourgeois prognosticators) by mass culture with its intentional or commercially motivated lowering of intellectual level and content, with its stress on entertainment or utilitarianism, and with its carefully protective censorship.

Another example is related to the question of education. A system of education under government control, separation of school and church, universal free education—all these are great achievements of social progress. But everything has a reverse side. In this case it is excessive standardization, extending to the teaching process itself, to the curriculum, especially in literature, history, civics, geography, and to the system examinations.

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Modern technology and mass psychology constantly suggest new possibilities of managing the norms of behavior, the strivings and convictions of masses of people. This involves not only management through information based on the theory of advertising and mass psychology, but also more technical methods that are widely discussed in the press abroad. Examples are biochemical control of the birthrate, biochemical control of psychic processes and electronic control of such processes.

It seems to me that we cannot completely ignore these new methods or prohibit the progress of science and technology, but we must be clearly aware of the awesome danger to basic human values and to the meaning of life that may be concealed in the misuse of technical and biochemical methods and the methods of mass psychology.

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Marx once wrote that the illusion that the "bosses know everything best" and "only the higher circles familiar with the official nature of things can pass judgment" was held by officials who equate the public weal with governmental authority. Both Marx and Lenin always stressed the viciousness of a bureaucratic system as the opposite of a democratic system.

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Although all these disgraceful phenomena are still far from the monstrous scale of the crimes of Stalinism and rather resemble in scope the sadly famous McCarthyism of the cold war era, the Soviet public cannot but be highly disturbed and indignant and display vigilance even in the face of insignificant manifestations of neo-Stalinsm in our country.

We are convinced that the world's Communists will also view negatively any attempts to revive Stalinism in our country, which would, after all, be an

awful blow to the attractive force of Communist ideas throughout the world.

Today the key to a progressive restructuring of the system of government in the interests of mankind lies in intellectual freedom. This has been understood, in particular, by the Czechoslovaks and there can be no doubt that we should support their bold initiative, which is so valuable for the future of socialism and all mankind. That support should be political and, in the early stages, include increased economic aid.

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The Basis for Hope:
1. Peaceful Competition

The prospects of socialism now depend on whether socialism can be made attractive, whether the moral attractiveness of the ideas of socialism and the glorification of labor, compared with the egotistical ideas of private ownership and the glorification of capital, will be the decisive factors that people will bear in mind when comparing socialism and capitalism, or whether people will remember mainly the limitations of intellectual freedom under socialism or, even worse, the fascistic regime of the cult [of personality].
I am placing the accent on the moral aspect because, when it comes to achieving a high productivity of social labor or developing all productive forces or insuring a high standard of living for most of the population, capitalism and socialism seem to have "played to a tie."

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There is only one justifiable conclusion and it can be formulated cautiously as follows:

1. We have demonstrated the vitality of the socialist course, which has done a great deal for the people materially, culturally, and socially and, like no other system, has glorified the moral significance of labor.

2. There are no grounds for asserting, as is often done in the dogmatic vein, that the capitalist mode of production leads the economy into a blind alley or that it is obviously inferior to the socialist mode in labor productivity, and there are no grounds for asserting that capitalism always leads to absolute impoverishment of the working class.

The continuing economic progress being achieved under capitalism should be a fact of great theoretical significance for any nondogmatic Marxist. It is precisely this fact that lies at the basis of peaceful coexistence and it suggests, in principle, that if capitalism ever runs into an economic blind alley it will not necessarily have to leap into a desperate military adventure. Both capitalism and socialism are capable of long-term development, borrowing positive elements from each other, and actually coming closer to each other in a number of essential aspects.

I can just hear the outcries about revisionism and blunting of the class approach to this issue; I can just see the smirks about political naivete and immaturity. But the facts suggest that there is real economic progress in the United States and other capitalist countries, that the capitalists are actually using the social principles of socialism, and that there has been real improvement in the position of the working people. More important, the facts suggest that on any other course except ever-increasing coexistence and collaboration between the two systems and the two superpowers, with a smoothing of contradictions and with mutual assistance, on any other course annihilation awaits mankind. There is no other way out.

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A number of socialist countries, including the Soviet Union, Yugoslavia, and Czechoslovakia, are now experimenting with basic economic problems of the role of planning and of the market, government and cooperative ownership, and so forth. These experiments are of great significance.

Summing up, we now come to our basic conclusion about the moral and ethical character of the advantages of the socialist course of development of human society. In our view, this does not in any way minimize the significance of socialism. Without socialism, bourgeois practicism and the egotistical principle of private ownership gave rise to the "people of the abyss" described by Jack London and earlier by Engels.

Only the competition with socialism and the pressure of the working class made possible the social progress of the 20th century and, all the more, will insure the now inevitable process of rapprochement of the two systems. It took socialism to raise the meaning of labor to the heights of a moral feat. Before the advent of socialism, national egotism gave rise to colonial oppression, nationalism, and racism. By now it has become clear that victory is on the side of the humanistic, international approach.

The capitalist world could not help giving birth to the socialist, but now the socialist world should not seek to destroy by force the ground from which it grew. Under the present conditions this would be tantamount to suicide of mankind. Socialism should ennoble that ground by its example and other indirect forms of pressure and then merge with it.

The rapprochement with the capitalist world should not be an unprincipled, antipopular plot between ruling groups, as happened in the extreme case [of the Soviet-Nazi rapprochement] of 1939-40. Such rapprochement must rest not only on a socialist, but on a popular, democratic foundation, under the control of public opinion, as expressed through publicity, elections, and so forth.

Such a rapprochement implies not only wide social reforms in the capitalist countries, but also substantial changes in the structure of ownership, with a greater role played by government and cooperative ownership, and the preservation of the basic present features of ownership of the means of production in the socialist countries.

Our allies along this road are not only the working class and the progressive intelligentsia, which are interested in peaceful coexistence and social progress and in a democratic, peaceful transition to socialism (as reflected in the programs of the Communist parties of the developed countries), but also the reformist part of the bourgeoisie, which supports such a program of "convergence." (Although I am using this term, taken from the Western literature, it is clear from the foregoing that I have given it a socialist and democratic meaning.)

Typical representatives of the reformist bourgeoisie are Cyrus Eaton, President Franklin D. Roosevelt, and especially, President John F. Kennedy.

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2. A Four-Stage Plan for Cooperation

Having examined in the first part of this essay the development of mankind according to the worse alternative, leading to annihilation, we must now attempt, even schematically, to suggest the better alternative. (The author concedes the primitiveness of his attempts at prognostication, which requires the joint efforts of many specialists, and here, even more than elsewhere, invites positive criticism.)

1. In the first stage, a growing ideological struggle in the socialist countries between Stalinist and Maoist forces, on the one hand, and the realistic forces of leftist Leninist Communists (and leftist Westerners), on the other, will lead to a deep ideological split on an international, national, and intraparty scale.

In the Soviet Union and other socialist countries, this process will lead first to a multiparty system (here and there) and to acute ideological struggle

and discussions, and then to the ideological victory of the realists, affirming the policy of increasing peaceful coexistence, strengthening democracy, and expanding economic reforms (1960-80). The dates reflect the most optimistic unrolling of events.

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2. In the second stage, persistent demands for social progress and peaceful coexistence in the United States and other capitalist countries and pressure exerted by the example of the socialist countries and by internal progressive forces (the working class and the intelligentsia) will lead to the victory of the leftist reformist wing of the bourgeoisie, which will begin to implement a program of rapprochement (convergence) with socialism, i.e., social progress, peaceful coexistence, and collaboration with socialism on a world scale and changes in the structure of ownership.

This phase includes an expanded role for the intelligentsia and an attack on the forces of racism and militarism (1972-85). (The various stages overlap.)

3. In the third stage, the Soviet Union and the United States, having overcome their alienation, solve the problem of saving the poorer half of the world. The aforementioned 20 per cent tax on the national income of developed countries is applied. Gigantic fertilizer factories and irrigation systems using atomic power will be built [in the developing countries], the resources of the sea will be used to a vastly greater extent, indigenous personnel will be trained, and industrialization will be carried out. Gigantic factories will produce synthetic amino acids and synthesize proteins, fats, and carbohydrates. At the same time disarmament will proceed (1972-90).

4. In the fourth stage, the socialist convergence will reduce differences in social structure, promote intellectual freedom, science, and economic progress and lead to creation of a world government and the smoothing of national contradictions (1980-2000). During this period decisive progress can be expected in the field of nuclear power, both on the basis of uranium and thorium and, probably, deuterium and lithium.

If such an all-encompassing scientific and technological revolution, promising uncounted benefits for mankind, is to be possible and safe, it will require the greatest possible scientific foresight and care and concern for human values of a moral, ethical, and personal character. (I touched briefly on the danger of a thoughtless bureaucratic use of the scientific and technological revolution in a divided world in the section on "Dangers," but could add a great deal more.) Such a revolution will be possible and safe only under highly intelligent worldwide guidance.

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The foregoing program presumes:

(a) worldwide interest in overcoming the present divisions;
(b) the expectation that modifications in both the socialist and capitalist countries will tend to reduce contradictions and differences;
(c) worldwide interest of the intelligentsia, the working class, and other progressive forces in a scientific democratic approach to politics, economics, and culture;
(d) the absence of insurmountable obstacles to economic development in both world economic systems that might otherwise lead inevitably into a blind alley, despair, and adventurism.

Every honorable and thinking person who has not been poisoned by narrow-minded indifference will seek to insure that future development will be along the lines of the better alternative. However only broad, open discussion, without the pressure of fear and prejudice, will help the majority to adopt the correct and best course of action.



An American physicist discusses the achievements of a Soviet physicist and the application of the Russian's ideas to the American scene

Isidor I. Rabi
Visiting Professor of Physics, M.I.T.

International Cooperation and the Perils of Science

Andrei Sakharov is a noted physicist who fulfilled the American dream by achieving enormous recognition at an early age—being made a member of the Russian Academy at the age of thirty-two rather than the usual age of fifty or sixty—and he is credited with making his main effort in the Russian thermonuclear bomb effort. He is often said to be a combination of Oppenheimer, Teller, and Bethe. To appreciate the magnitude of his achievement, compare Soviet nuclear development with that of other countries: it took the British quite a time although they were very close to the U.S. during the war; it took the French many, many years; whereas the Russians produced a bomb almost at the same time as the United States.

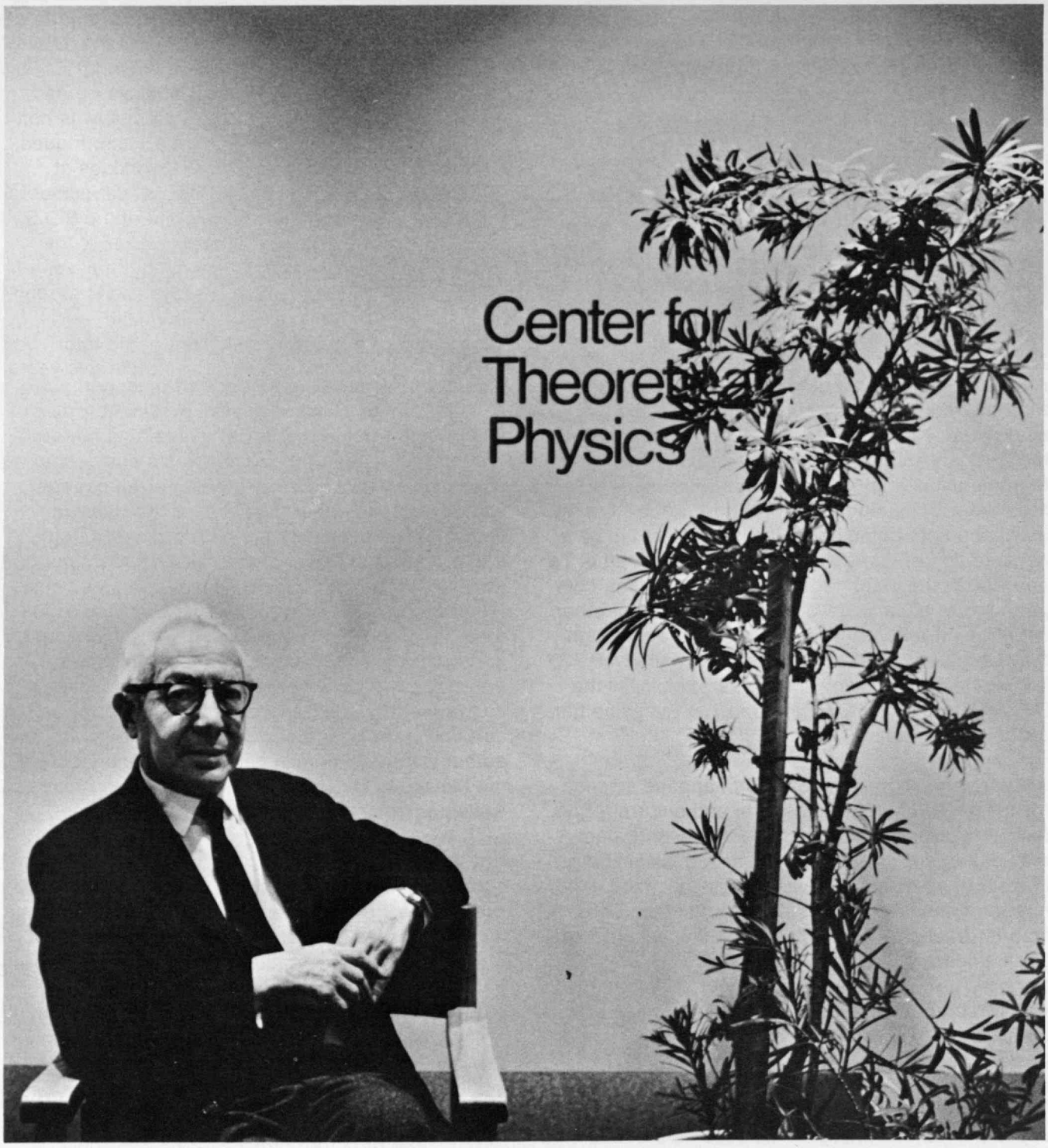
Sakharov, realizing the potency of applied science for the destruction of human life and cultural artifacts—such as housing, factories, transport, communication and water supplies, as well as schools, libraries, and museums—seems to have made it his mission to consider almost the whole range of human effort and to develop proposals which, if acted upon sincerely and universally, would lead mankind toward a bright future. He spells out the alternatives with force and with eloquence, and he is not afraid to make proposals which we would consider naive. Twenty years ago American leaders had similar naive beliefs. The Acheson-Lilienthal Committee suggested a world corporation to control all aspects of atomic energy. This became the American position in the United Nations, and eventually the majority report of that body. The specialists in international relations, the sophisticates who have achieved little or nothing except exacerbation of the Cold War, would find him optimistic to the point of absurdity, which is exactly his charm and force. Aims must match desires and needs, or the small steps which the timid advocate result in situations where events overrun plans and actions. In spite of the logic of the Greek sophisticates, the hare does win over the tortoise.

Does Sakharov Exist?

Sakharov's paper apparently enunciates a position he had developed over a period of time, perhaps in collaboration with associates, presumably also of a very high rank in the Soviet intellectual hierarchy. When I first read it, I thought it was a plant—that no such man existed and that it was a production of some agency of either the C.I.A. or the Russian equivalent—because of the extraordinarily frank and profound criticism of the management and the administration of the Soviet Union. This was before the invasion of Czechoslovakia and seemed to indicate a growing degree of criticism which would, in our image of the Soviet Union, be considered treasonous. A similar paper in the United States at the time of the late Senator Joseph McCarthy would certainly have been considered subversive, and the author would have been called on to testify before the McCarthy Committee or the House Un-American Activities Committee.

However, I was assured by those who knew better that Sakharov actually existed and had the highest credentials. From the context of the paper, there is no reason to doubt that Sakharov is a believer in the Socialist system to the same extent that we are believers in the American system and revere the Declaration of Independence and the Constitution of the United States. Almost every American feels that his country has a system of government so excellent that it is almost of divine inspiration, but there is also a common feeling that the government is run incompetently. Sakharov's position with repect to those who run his government is very similar, and he speaks of the Russian government in a tone similar to that used by Eisenhower referring to the "mess in Washington" of the Truman administration.

Therefore, it is clear that most of us will have very little difficulty in finding common ground with Sakharov and his group on almost any fundamental question, and the ideological differences between communism and capitalism would in such discussion become hardly more than a difference of opinion with respect to administration and organization.



Isidor I. Rabi, the distinguished Nobel Laureate, has honored M.I.T. with his presence as Karl Taylor Compton Visiting Professor of Physics during the year just ending. He has made his headquarters in the new Center for Theoretical Physics, and through seminars and meetings he has catalyzed a dialogue on the social implications of science which has extended far beyond the limits of the Physics Department (see Technology Review *for February, pages 62-63). (Photo: Benjamin Litson)*

The Basic Theses

In the paper Sakharov has two basic theses which he enunciates right at the beginning:

First, civilization is imperiled by the threat of nuclear war, famine, degenerating mass culture, and bureaucratic dogmatism. This division of mankind threatens it with destruction. In this situation any preaching of separatism among nations is madness. "Only universal cooperation . . . will preserve civilization." His views stem from conditions in Russia but many of the points fit the American situation as well.

To this first thesis, few liberals will find objection. It is this apocalyptic vision which is the basic reason why so many American scientists in the past have been exerting much effort to make this very point clear to their fellow citizens and to the world.

"The second basic thesis is that intellectual freedom is essential to human society—freedom to obtain and distribute information, freedom for open-minded and unfearing debate and freedom from pressure by officialdom and prejudices. . . .

"But freedom of thought is under a triple threat in modern society—from the opium of mass culture, from cowardly, egotistic and narrow-minded ideologies, and from the ossified dogmatism of a bureaucratic oligarchy and its favorite weapon, ideological censorship. Therefore, freedom of thought requires the defense of all thinking and honest people."

This is clearly recognizable as basic American credo; these freedoms are embodied in our Constitution and Bill of Rights. But in the Soviet context this was an important statement to make. From our viewpoint he is a bit naive because America has had these freedoms for a long time and the millenium has not yet come, but from somebody inside of Russia the realization of these three freedoms seems such a wonderful goal to strive for —a utopia for these people who are seeking for a way to express themselves. On the day when the word plutonium was declassified in this country, Walter Zinn, Director of the Argonne Laboratory, walked along the street shouting "plutonium, plutonium." Oppression in this respect is stultifying.

The Dangers of Secrecy

The dangers of secrecy in our form of government are great. Traditionally, American policy is set by a combination of forces—the press, radio, television, the church, the business community, labor—all having their views, and our policy forming as a result of all these forces. When through secrecy you remove one of these components then, of course, you have an unbalanced force, and the whole policy develops dangerously.

These three freedoms which we in the United States firmly defend, are nevertheless under continuous pressure from certain elements in Congress and in American society. In the Soviet Union they represent an abstract ideal which has been contrary to Russian practice for centuries and is now dangerous even to express. One can clearly see the courage which was required for a highly placed person like Sakharov to circulate this dangerous document.

The elaboration of these theses requires the rest of the paper, which is about 10 thousand words long. The greater part of the paper is devoted to a detailed and thoroughgoing criticism of the administration of the Soviet Union; it is a powerful polemic against neo-Stalinism, mindless bureaucracy, special privilege. Surprisingly, there is considerable praise for the American system. Indeed, he has much higher regard for the workings of democracy than many, if not most, of the members of the New Left. From the standpoint of the S.D.S., he speaks as if he were a fringe member of the American Establishment. He points out that American capitalism is not so bad after all and is hardly worth overthrowing since the capitalistic classes use only about 20 per cent of the total production, and this is made up in about five years by the growth in the economy. A revolution would cause such a disruption that it would take many years before the public would recover from the loss. So, he says, let sleeping dogs lie. It's not so bad because the American as well as the Soviet laboring classes have made very important progress. This sounds like the same notion you might expect from a physicist who's looking at things objectively: if the economy is successful, don't interfere.

He condemns the Vietnam war, as many of us do, but he also condemns in very strong terms and at length the mischievous Russian intervention in the Middle East which he considers both dangerous and immoral. He condemns racism, both domestic and foreign, but feels optimistically that improvement in the economic situation, both domestically and abroad, will ameliorate this condition.

Soviet-American Cooperation

Americans could very readily join with him in planning toward a future world which would be a better and happier place in which to live. Sakharov views the future as hopeful only to the degree that the two super powers, the U.S. and the U.S.S.R., accept certain principles in dealing with each other and with the outside world. These principles are:

"1. All peoples have the right to decide their own fate with a free expression of will. This right is guaranteed by international control over observance by all governments of the 'Declaration of the Rights of Man'. International control presupposes the use of economic sanctions as well as the use of military forces of the United Nations in defense of 'the rights of man'.

"2. All military and military-economic forms of export of revolution and counterrevolution are illegal and are tantamount to aggression.

"3. All countries strive toward mutual help in economic, cultural, and general-organizational problems with the aim of eliminating painlessly all domestic and international difficulties and prevent-

ing a sharpening of international tensions and a strengthening of the forces of reaction.

"4. International policy does not aim at exploiting local, specific conditions to widen zones of influence and create difficulties for another country. The goal of international policy is to insure universal fulfillment of the 'Declaration of the Rights of Man' and to prevent a sharpening of international tensions and a strengthening of militaristic and nationalistic tendencies."

Every one of these points is an attack on long-standing Soviet policy and long-standing Soviet action and also on American policies though perhaps not to the same degree.

In the last part of his paper Sakharov makes a fascinating series of proposals and predictions for international cooperation. He predicts a growing ideological struggle in the Soviet community by Stalinist and Maoist forces on the one hand, and the realistic forces of the left community on the other hand, which will lead to a deep ideological split on an international, national, and intraparty scale, leading in turn to a multiparty system and ideological victory for the realists who will affirm a policy of peaceful coexistence, strengthening democracy, and expanding economic reforms. He expects this to take place between 1960 and 1980, and almost 10 years have passed for this prediction. He considers, of course, that this is a most optimistic prediction. He is not a firm believer in a multiparty system but believes it to be an inevitable consequence when the party refuses to rule by the scientific democratic method required by history. This is Marxist language but it may be reasonable.

Helping Underdeveloped Nations

Sakharov also predicts that demands for social progress and peaceful coexistence in the United States and other capitalist countries will overcome the alienation between the socialist states and the capitalist states and for this part of his prediction the dates go from 1972 to 1985. He recommends and predicts a very strong effort, perhaps by the imposition of a 20 per cent tax on the gross national product of each developed country, to help the underdeveloped countries to reach a stage of industrialization and modernization to become full partners in a world system. This will create peace, he feels, will ameliorate racism, and will take place between 1972 and 1990. By the year 2000 he figures that we will be well on the way to constructing a more rational and happier world.

If Sakharov had put pencil to paper he would have realized that his proposal meant creating something like $300 to $400 billion a year in aid to developing countries. It would have been clear to him that such aid could not be used effectively unless the governments of these countries could be taken over by outside powers to insure efficient utilization of the money. The effort would be on the order of 10 times as large as that presently expended by the United States in the Vietnam war. One can overlook this astonishing naivete when one considers the high-mindedness and sincerity of his proposal.

These remarks are an inadequate paraphrase of the breadth of the considerations contained in the Sakharov article, but there are important implications for scientists—implications which indicate the special point of view of the scientist when he turns to the broad social and cultural problems and which also reflect the nature of the culture of science.

In the Sakharov document there is very little reference to the past, except the cautionary tales of Stalinist-period horrors which he recites in some detail with desperate apprehension of a return, or even a partial return, to those dark days. There is little or no reference to the culture of Russia, pre-Revolutionary or earlier, none to the mythical mission of Holy Russia, and nothing in the language to suggest the standard type of parochial patriotism. Underlying is his belief in the universal desire for all peoples to live at peace with their neighbors, both domestically and internationally. Striving for this goal is taken as a common, unquestioned good. While recognizing the variety of human cultures and organizations, he seeks a mechanism to suppress the extreme faults such as Maoism and Stalinism which would disturb the peace. His warning against the dangers of warfare and the physical destruction of people and their structures, of the dangers of hunger and pollution, the psychological and cultural forms of brainwashing which he has seen and which may be developed, he believes, to more extreme forms, helps him to strengthen a more positive attitude toward the future. His assertion of the three freedoms is essentially a plea for a world in which science and the intellect are free to develop to their fullest potential by being open to all knowledge, by being free to express views without hindrance and to criticize established dogmas without fear of retaliation. These freedoms are essential to the full creative life of the individual and of the community. Sometimes they have been possessed by a very small class, and at other times they have been widely enjoyed as is the case in parts of the United States and the Western world.

The Broad Role of a Teacher

Sakharov is not, apparently, and never has been a professor so there is nothing in this paper that refers to education itself. But by his very example, Sakharov shows that the tradition of confining the scientist in his public expression to his specific, narrow specialty deprives both the teacher and the

student, whether in the school or in the university or in a research institute or industry, of those basic elements of culture which science represents. By restricting our teaching to our specialisms, we tend to teach skills rather than basic culture; the student, rather than being brought to a broad vision, is turned in the direction of narrow informational learning. He loses sight, and soon forgets, that he is part of a culture which has brought so much freedom and so much good, and which has had such a liberating effect on the human spirit. There is a fear that if a scientist ventures outside his sphere he will lose the certainty and authority which is his in his own subject. There is certainly a great danger that this will be so, but the still greater danger exists that he will miss the more human part of the contribution which science has given to the world in the last few hundred years.

I will illustrate by a specific case which made me understand that I had been inadequate to the opportunities available to me during my teaching career. Since the end of World War II, I have been actively concerned with the relations of science and government. I have been a member of the General Advisory Committee of the Atomic Energy Commission, of the President's Science Advisory Committee, of the Naval Research Advisory Committee, the Science Committee of the International Atomic Energy Agency, and other committees of this sort. As may be expected, I spend a lot of time away from the university in the course of these activities. Columbia has always been very liberal in its contribution to the public welfare. But until recently, during the disorders at Columbia last spring, it never even occurred to me to discuss with my colleagues or to speak to the students, graduate or undergraduate, of the problems of the United States as I saw them from a connection with the government. Columbia never asked me to report, but would not have prevented me, of course. I should have done it myself, and I missed a very great educational opportunity. Students at Columbia have come to a point where anything connected with the government is wrong, and they have not begun to understand—and we have not tried to explain to them—that this connection of the universities, the scientists in the universities, and the government is an extension of the democratic principle. It provided direct connection between the officials of the government and the intellectual community of the country which possesses enormous stores of knowledge which the government doesn't have. In every resource—physical science, political science, language, diplomatic history—knowledge is in the universities and through this system of close collaboration with the government we have a vastly extended and civilizing influence on the government. I shudder to think what the situation might have been without the pressure of these forces operating very quietly, invisible to the public. This our students can not appreciate, and I can't blame them because we never told them about it.

Educating the Whole Man

The Sakharov paper made me feel inadequate to the needs of the times and regret the narrowness with which we pursue and teach our disciplines. Our teaching should aim to educate the scientist and engineer as a whole man and not only as an expert. We should try to achieve this not by adding courses in the so-called humanities and social sciences but as an integral part in the instruction of the science itself. Students should be aware of the social environment which is necessary to produce science or high technology, what implications science and technology may have for the social structure and, insofar as we can see, what material changes they might make in the environment. Students should not feel detached from the effect of their activities on the society nor should they be discouraged from applying the methods of thought and feeling from their own disciplines to the broader problems of society. In this sense, the scientist or engineer has a broad social responsibility and the statement "I don't know anything about this—I only work here" is as immoral as it is servile. Science and technology have become far too important in the world (and will still be more important in the future) to leave to generalists who share a large area of ignorance and irrelevant experience.

Sakharov has written many things, most of which have been known to us, but he has put them all together in one form and under very broad rubrics —the danger of the division of mankind and the necessity for freedoms. He has illustrated them in some detail. We have known all these points, but only a few Americans of his standing in his own country have made statements which in our context would be as courageous and far-reaching.

I once gave a lecture at Los Alamos under the title, "What Have the Russians Done for Us Lately." I was referring to the Russian stimulus through Sputnik I to improve our education and to advance various other important projects. I regard the Sakharov paper as another contribution to what the Russians have done for us lately. It offers a challenge to American scientists and, for all its naivete, it offers us an invitation to produce a document which is more profound, based on our greater experience in an atmosphere of freedom and open communication within our country and with the whole world.

Isidor I. Rabi, Visiting Professor of Physics at M.I.T., recently retired as Professor of Physics at Columbia University. He served as Associate Director of the M.I.T. Radiation Laboratory from 1940 to 1945 and received the Nobel Prize in Physics for his work in the electrical and magnetic properties of the atomic nucleus in 1944. This paper is adapted from a talk given by Dr. Rabi at M.I.T.



Andrei Sakharov reflects the long history of the Russian intelligentsia, the educated class which has maintained independence of thought despite persecution

Harrison Salisbury
Assistant Managing Editor,
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The Intelligentsia and the Universal Rights of Man

Andrei D. Sakharov's ideas, which are deeply humanist and internationalist, relate clearly to the mainstream of the Western tradition of scientific inquiry and freedom of speech and ideas. Because this is true, many people are baffled and bewildered by Sakharov—and somewhat suspicious of him and what is attributed to him. They find it hard to believe that his ideas can come out of the Soviet Union—let alone from a physicist. They find it hard to believe that he exists, but he does. Even though none of the physicists with whom I have talked know him personally, they know many of his friends. And we know him by his record, which can be traced through the scientific journals and unpublished media.

Sakharov made his debut at a very early age, with the extreme brilliance that seems to be characteristic of physicists. His papers appeared publicly for a few years. He then went into highly secret work on Soviet nuclear weapons, particularly the hydrogen bomb. During this period no work of his appeared publicly. Quite obviously he was working in classified institutions where the identity of the scientists is not made known outside the Soviet Union, and is even restricted within the Soviet Union.

Then, after a number of years, the situation changed. Apparently, his work was no longer secret or he had been declassified in some fashion, because a few of his scientific papers began to appear. Then suddenly we find him signing his name to significant documents, documents of protest, challenge, and criticism—not always in *Pravda, Izvestia,* and the *Literary Gazette,* but often in journals being circulated through a sort of underground. It might even be called an "overground" because so many people belong to it, circulating ideas through what Sakharov calls the "scientific-technological intelligentsia," a growing class of educated, politically alert people in the Soviet Union.

The Russian Intelligentsia

In the Russian language, an *intelligent* is a member of the educated strata of society. The term goes back to the time when education was the privilege of a narrow layer of Russian society. The relatively small, noble class which existed under Peter gradually expanded until the time of the French Revolution when Catherine, who had encouraged education and corresponded with the great minds of Europe, apparently began to fear that the French example might be followed in Russia.

The intelligentsia which emerged in Russia was one with a class concept and an ethic. The intelligentsia had advantages denied the great amorphous mass of serf Russia, which had minimum rights and which was kept in illiteracy. The educated people were special people. They took upon themselves a special responsibility which, although it might be called a European tradition, developed nowhere to the extent that it did in Russia. Having knowledge and ability, perhaps being teachers, writers, poets, scientists, or even members of the higher bureaucracy, they felt an obligation to their society and to their country.

Russia had one of the few surviving absolute monarchies and little liberal tradition. When frightened Catherine brought back the tyranny which had so characterized the Romanov dynasty, the intelligentsia, exposed to education and ideas from the age of enlightenment in Western Europe, found themselves living in a dark, outmoded, feudal society. They took upon themselves the obligation of improving the lot of the people.

Early in the Nineteenth Century the Napoleonic war brought back into Russia people who had seen what life was like in Western Europe and who wanted to bring Russia up to date with the rest of the world. The first attempt, the Decembrist Revolution of 1825, proved abortive. Some of the intelligentsia, including many of the noble officers, participated in this action, which was intended only to give the Czarist system a constitutional basis—not to overthrow the entire system. It was primitive, naive, ill-prepared. The absolute monarchy was in

"Sakharov exists, and there are many more like him. He is not a single person speaking only for himself. This is not just one manuscript smuggled out of the Soviet Union..."

no mood to give in to these wild-eyed liberals, who wound up either being shot or being sent into exile in the most distant places of Siberia. But the effort, to some extent, left a tradition of *noblesse oblige,* the duty of the young, educated person—the privileged person—to dedicate himself to changing the system. There seems to be a great deal in common between the pure and principled feeling of these young people of Russia and the spirit shared by so many young Americans today.

This tradition of *noblesse oblige* became deeply embedded in Russia, an outstanding characteristic of intellectual and political life. The movement and its tradition persisted from the time of the Decembrist Revolution through that century, culminating in the 1917 Revolution which finally overturned the Czarist system. But the final result in 1917 was not what the early revolutionaries had envisioned. Each generation of revolutionists had tried various techniques. Some became anarchists, some became dedicated to terrorism. They assassinated the Czar, they killed many of the top officials, they indulged in all sorts of ill-fated, poorly organized conspiracies to overturn the system. Others, some hundreds or even thousands, went into the country where the peasants lived and attempted during the summers to teach them the rudiments of literacy. These experiments went badly: many young people were lynched by the peasants, who feared them or regarded them as an alien element somewhat as the American "peasants" might regard the hippies of today. They were not liked; their efforts to improve the state of the peasantry didn't succeed. But this didn't kill the tradition.

The Intelligentsia and the Revolution

George Kennan, who has studied the evolution of Russian society and particularly the role of the *intelligent,* feels that Russia spent a hundred years attempting to produce a democratic society and an enlightenment similar to that which occurred in France, England, Germany, and America. The revolution of 1917 finally succeeded in a rather bizarre fashion. In the first place, the actual overturn of authority in March, 1917, happened by accident. The irony was that none of the organized revolutionaries—the intelligentsia, the Communists (the Bolsheviks)—participated in this event. It was brought about by the housewives of Petrograd who got so tired of standing in line for bread and matches and kerosene that they began to grumble. They grumbled more the next day and even more the third day. Then everybody in the city joined them, and the regime toppled. The leaders of the revolutionaries were so dispersed—Stalin in Siberia, Lenin in Switzerland, and Trotsky in the New York Bronx—that it took them some time to assemble and take over the revolution.

The irony of what happened in 1917, in Kennan's opinion, was that the Bolshevik party was formed by Lenin as a small, tightly organized, conspiratorial group with absolute discipline because he felt this was the only way they could topple the system. The ideal and objectives of Lenin and the Bolsheviks were to produce the liberal, noble society that the intellectuals had been dreaming about for a hundred years. Instead, partly because Lenin died in 1924 and partly because of the methods the Bolsheviks used—fighting the secret police with a secret revolutionary organization, setting up a new secret police when they came into power, and finally co-opting some of the old Czarist secret police—the country under Stalin reverted in principle to much the sort of system it had been before.

Under Stalin the secret police became all-powerful; censorship clamped down; newspapers were suppressed; all political parties except the Bolshevik Party were suppressed. The right of free speech vanished; an author could write only according to the dictate of the party. The poets were banished; plays were taken off the stage; art, which had blossomed during the first years of the revolution, went back to the *Saturday Evening Post*-realist style that had been favored under the Czars. Having gone through the terrible trial of the revolution, instead of achieving a release and a new kind of life, Russia found itself with a system not

really much different from what they had under the Czars and, unfortunately, even more paranoid and efficient. Over the years Russia did find itself moving toward enormous scientific, industrial, and technological achievements, but at the price of a devastating blow to intellectual life throughout the country.

Durability Under Stalin

In spite of being shot and exiled, tormented and suppressed, the magnificent class of intellectuals did not die out. Those who lived through Stalin also survived in spirit. If they were writers, like Pasternak, they had been writing and putting their work away in a drawer, hoping that nobody saw it. Now they dared to bring it out and publish it; *Dr. Zhivago,* for example. Pasternak's *Dr. Zhivago* is but one of hundreds of examples of the Russian *intelligent*'s persistence, durability, and tradition. It could not be killed by a hundred years of the Czarist oppression; it could not be killed by what is now 50 years of Soviet suppression. It persists, it lives, it endures, and it may be the most hopeful single aspect of human activity in the world today. It is this idealistic tradition of the intelligentsia that produced Sakharov, a man who not only sees his whole country but who sees the entire world in terms of an idealistic society in which people may live and flourish instead of being doomed to death and disaster. This group of people, having survived a hundred years of Czarism and 50 years of the Soviet regime, can endure anything.

If man endures this kind of experience he emerges tempered, with the strength, for example, of the Russian writers who hid away their work during the Stalin regime and then brought it out after 1953. This strength of spirit is not limited to the literary field. In the field of physics, there is the remarkable story of Peter Kapitsa, the Russian physicist who was working in England's Rutherford Laboratory and was lured back to his homeland with the promise his laboratory at Cambridge would be duplicated precisely. Rutherford even shipped Kapitsa's special equipment to Russia to be sure he didn't lack the means of carrying on his research. Undoubtedly, Kapitsa felt he should do this for his country as a loyal Russian. Also perhaps he was homesick, because Russians are more homesick than anyone except, perhaps, Americans, when they have to live abroad a long time. Certainly there was nothing that Stalin and his system needed more than a brilliant physicist with the freedom to do whatever his mind dictated. Supposedly this freedom was to be available to Kapitsa. He continued his work for a period of time, and then came the question of working on nuclear weaponry. He refused to budge; he would not go into a military laboratory; yet he was too great for them to execute. For some reason they didn't put him into one of the police laboratories described so well in *The First Circle* by Aleksandr Solzhenitsyn. Kapitsa, his laboratory taken away from him, was immured in his house under police arrest for years, maintaining only tenuous connection with his fellow scientists. Finally, after Stalin's death, was he a broken man? Not at all. His spirit had survived. He continued his work from the point where he had been before. This, I think, is the most striking characteristic of this magnificent class of people in Russia.

Sakharov exists, and there are many more like him. He is not a single person speaking only for himself. This is not just one manuscript smuggled out of the Soviet Union, leaving us to wonder if there are others like Sakharov. We can count many other influential people in the Soviet Union who think as Sakharov does. The evidence of his own book and discussions by other Russian scientists show that his ideas are known. He also has had the courage to write and circulate these ideas in his own country, even though they are not printed in *Pravda.*

Free Government Criticism

The text of the Sakharov Papers shows that it contains the ideas of more than one person. He describes it as a "pamphlet, advanced for discussion

by its readers," and he specifically notes that it has been under discussion before. He has made changes, additions, emendations, and probably suppressions, as the result of discussions—free discussions—held in the Soviet Union. It still seems strange to many Americans that a group of Russians, even though they may be very highly placed physicists, can hold a free-wheeling discussion criticizing their own social system and their own government. It is interesting that they don't limit their discussions to their own society and government but that they let their ideas range out to the United States, China, and the rest of the world.

But besides Sakharov and his physicist friends, who else is participating in these discussions? Do they have allies in other scientific fields and in other intellectual fields? We know there are many others; for example, in Sakharov's writing it is evident that he is familiar with Solzhenitsyn's work. Solzhenitsyn has not had anything except his first book *One Day in the Life of Ivan Denisovich* published in the Soviet Union. *The First Circle* and *The Cancer Ward* have not been published there. Yet it is evident that Sakharov has read *The First Circle.* The manuscript *does* circulate inside the Soviet Union.

This circulation of unpublished manuscripts in the Soviet Union is an utter absurdity. In Solzhenitsyn's case, the secret police seized his manuscript about three years ago and under their auspices thousands of multigraph copies have been made and are circulating all over Moscow. Indeed, Solzhenitsyn has complained to the Soviet Writers Union and the Soviet government that his manuscript was being published without his permission by the secret police. But then, this is no more absurd than many things done in the tradition of the secret police—the present police and the Czar's. It was they who first permitted Marx's work to circulate widely in Russia, because they had looked at it and had said, "Oh, this is just a lot of dry economics that nobody can understand." So *Das Kapital* was allowed to circulate in Russia in the eighties.

Solzhenitsyn is the outstanding literary figure in Russia today. He is regarded by every educated Russian, including many in official positions, as their only living classic. The poet Yevtushenko has said that all except a few party-liners consider Solzhenitsyn a monument to their culture. Although politics doesn't allow him to be published, he is known, he is read, and his influence is strong. To be against a man like Solzhenitsyn would be comparable, in Tolstoy's time, to saying that Tolstoy is nothing but a revolutionary.

Russian governments traditionally have been unfriendly toward great writers. We can trace this to the Nineteenth Century, beginning at the time of Pushkin and continuing up to Dostoyevsky. Dostoyevsky and some of his companions were arrested and condemned to death. They were led out to be hanged, and only when they were on the platform did the Czar suddenly announce it was a trick, and they were instead sentenced to life imprisonment.

The Czars failed to crush the spirit of the writers of the Nineteenth Century and so it has been with the Soviet Regime. Of course, the governments have managed to reduce their number. In Stalin's time scores of writers were executed. But short of actually shooting them, the government cannot suppress them.

The Intelligentsia and the New Politics

The young people are the strongest element in the new politics of the Soviet Union—in what Americans might call the "new left." I don't want to exaggerate this strength because it would be easy for us to get overly enthusiastic and think perhaps tomorrow they will take over, and Solzhenitsyn will become Minister of Culture and Sakharov Minister of Nondefense. That just isn't going to happen. But the problem that worries the Soviet officials most is the fact that the intelligentsia, the thinking people of the country, the brilliant physicists and scientists, the writers, and particularly the young people are disenchanted with the Soviet system of government. They think it is a sham, that it is full of hypocrisy, and that it just is not relevant to what's happening today. This may strike a responsive chord with some Americans.

The party has tried to get back into contact with the young people, but it has little chance. The only way Stalin maintained control of the country was by willingness to kill people and to send them to concentration camps by the hundred thousand. If the current regime is willing to do this, perhaps they can get back control of the country. But they can't win the spirit of the people, and certainly not the spirit of the young people.

Anyone connected with the Bolshoi Theatre, the Academy of Sciences, the Gorki Institute of Literature, or anyone attending Moscow University or Leningrad University probably knows who Sakharov is, knows his proposals, and if he doesn't possess a copy of the document, he has had one in his hands, just as he has read Solzhenitsyn and just as he has read many unpublished poems of Yevtushenko and Voznesensky. There is a great circulation of ideas, and this is the source of much inspiration in Soviet society.

There is another side to this, of course. The intelli-

gentsia constitute only a small portion of the Soviet people. There are many who aren't concerned with these issues. The enormous middle class is waiting for the factories to start turning out the new Fiat cars by the hundred thousand. There are many people whose main concern is getting a longer vacation to spend in the Crimea. How can the intelligentsia influence a society in which they are so far outnumbered? We have in America an anti-intellectual tradition. The United States was founded and built largely by the sweat of the brow under difficult and primitive conditions, and while there was a certain respect for the man with a book there tended to be more respect for the man with muscle. Even in our modern complex technological society this frontier mentality has persisted.

In Russia that is not and never has been true. The intellectual has always been looked up to by the masses; even Stalin, who executed them by the thousands, venerated the intellectuals. It must have disturbed Stalin immensely that he failed to get the intellectuals on his side. The Czars had difficulty with the intellectuals. This problem has bothered every regime. It undoubtedly causes Kosygin and Brezhnev and the present rulers to sleep uneasily because the *intelligent* has a tradition of conscience and dedication to humanity which is more attractive to the younger generation than the ideals of communism. Young Russians are not against communism: they simply believe that the leaders of their country are not true communists. They believe the original idea of communism has been aborted and distorted by career-seekers and bureaucrats.

Youthful Idealism

Fifty years ago when Bolshevism took over in Russia, this idealism was not as pure as the young people today imagine. They have created an image of a pure-minded revolution which somewhere went astray. It is this image they would like to bring back to the present society. In other words, they are searching for an ideal.

Will they find it? In the world today—with a precarious balance between super powers, the threat of nuclear weapons hanging over us, problems of over-population, food, pollution—it is a difficult ideal to achieve. The deep tensions between the United States and the Soviet Union, between the Soviet Union and China, between the United States and China, the Vietnam crisis in Southeast Asia, and the uneasy situation in the Middle East are problems of such magnitude that they threaten the obliteration of the world and the human race. If there is to be a victory for idealism and humanism in the Soviet Union, in the United States, in China, or in any large country, these problems of the world and human survival have to be coped with. That's where Sakharov comes to the point. His proposal tackles these problems.

Sakharov may seem primitive; he may seem over-idealistic and his program beyond the capacity of working politicians. Perhaps so, but maybe the politicians need to be replaced by others who have more vision. Sakharov has given us our outline program for doing this.

Why Not the Rights of Man?

Sakharov does not expect blind acceptance—a group of Americans saying, "Hooray for the Sakharov program." He wants America to come up with meaningful ideas that extend and elaborate his. Everyone may have a different view of what is the most important idea in the document, but I think there will be a general agreement that his concept of the declaration of the rights of man, already approved by the United Nations—but not by the United States Senate nor the Supreme Soviet—is brilliant. At the moment the declaration is a pious declaration; Sakharov would like to make it the rule of law in the world. And why not?

It's a blinding idea. But is it practical? Would the United States submit to a United Nations force going into Alabama to enforce the equality of races? Would the Soviet Union permit a United Nations force to go to Uzbekistan and protect the rights of the Uzbeks? And would they permit dismantling of the concentration camps in Siberia? Would China ever permit a United Nations force to investigate whether the native peoples in Szechwan Province are being given the same rights as the Han people? But why shouldn't the United States, the Soviet Union, and China accept this? Why shouldn't nations give up some of their sovereignty for the sake of benefiting mankind?

I believe we should, and so does Sakharov.

Harrison E. Salisbury is Assistant Managing Editor of the New York Times *and was that newspaper's Moscow correspondent from 1949 to 1954. A noted authority on the Soviet Union, he is the author of the current best seller* The 900 Days. *This article was adapted from a talk given by Mr. Salisbury at M.I.T.*



Modern societies need to make their decisions more consciously and more responsibly. Can scientists and engineers more effectively contribute to this purpose?

Daniel Bell
Professor of Sociology
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The Balance of Knowledge and Power

The relation of knowledge to power has changed quite dramatically in the middle of the Twentieth Century. Stated quite simply, knowledge, in the form of technical skill, has become a constituent aspect of power, acting as a constraint on those who wield power; and, as the nature of power changes in contemporary society, knowledge has become a mode of access to power.

Historically, the basis of power in western society has been private property. Property in land, and later property in things (e.g., machines), was the means to power—economic and political. On occasion, military means and violence were stepping stones to power, as in the case of the *condottieri* in the Italian city states of the Renaissance; but having seized power by violence, this power could only be stabilized and transmitted by converting it into a more enduring form through property. With the rise of democratic mechanisms, politics became a somewhat autonomous route to power. The political machine, the political party, the mobilization of masses became a means for individuals and groups (functional and ethnic) to achieve power in the society. One forgets how recent is the party system. The framers of the Constitution and the writers of the Federalist Papers had no conception of a party system. When the party system emerged in the U.S., around 1800, it was the first such party system in the world. It was less than 100 years ago, with the rise of the socialist movements of Europe as an organized political force, that one saw "mass parties" and later "cadre parties," with full-time functionaries, as a permanent fact of political life.

The emergence of "knowledge" as a political force is even more recent. One can take as symbolic the role of science in World War I and World War II. In *Modern Science and Modern Man,* James Bryant Conant, who before becoming a distinguished educator was a prominent chemist, records that when the United States entered World War I, a representative of the American Chemical Society called on Newton D. Baker, then Secretary of War, and offered the services of the chemists to the government. He was thanked and asked to come back the next day when he was told that the offer was unnecessary since the War Department already had a chemist. When President Wilson appointed a consulting board to assist the Navy, it was chaired by Thomas Edison, and this appointment was widely hailed for bringing the best brains of science to the solution of naval problems. The solitary physicist on the board owed his appointment to the fact that Edison, in choosing his fellow members, had said to President Wilson, "We might have one mathematical fellow in case we have to calculate something out." In fact, as R. T. Birge reports (in his study "Physics and Physicists of the Past Fifty Years," in *Physics Today,* 1956), during World War I there was no such classification as physicist; when the armed forces felt the need of one, which was only occasionally, he was hired as a chemist. Contrast all this with the Defense Department today!

But knowledge, particularly scientific knowledge, is not only a "handmaiden" of power; it is the basis for the transformation of the entire social and political structure of society. What is arising today —and the skeleton of the new social structure is already visible—is a "post-industrial society" in which the source of innovation and the basis of power are the research sectors of the society.

Society Dependent upon Science and Research

A "post-industrial society" has many dimensions, but for our purpose we can, schematically, indicate five necessary features: the centrality of theoretical knowledge; the primacy of the knowledge institutions; the strategic role of "human capital"; the emergence of a new intellectual technology; and the creation of a "future orientation" in the society.

The centrality of theoretical knowledge derives from the fact technology and science have become intertwined in a wholly novel way. Most of our major industries—steel, automobiles, electricity, telephone, aviation—are nineteenth-century industries

"...the knowledge institutions...become increasingly the primary institutions of the post-industrial society. The strength of a society becomes increasingly dependent on the quality of its research and scientific effort."

not only in their chronological origin (steel somewhat earlier with Darby's coking process, aviation somewhat later) but in their pattern of invention. They were created largely by talented tinkerers who worked independently of the efforts of science, just as science was quite independent of technological usage. Contrast the evident difference today. As Richard Nelson and his associates have written (in *Technology, Economic Growth and Public Policy*): "Compare Watt's utilization of the theory of latent heat in his invention of the separate condensing chamber for steam engines, or Marconi's exploitation of developments of electromagnetism, with Carother's work which led to nylon, Shockley's work which led to the transistor or recent technological advances in drugs and military aircraft. In the earlier cases the scientific research that created the breakthrough was completely autonomous to the inventive effort. In the later cases, much of the underlying scientific knowledge was won in the course of efforts specifically aimed at providing the basic understanding and data needed to achieve further technological advances."

Today, innovation—scientific, technological, and economic—is wholly dependent on the codification of *theoretical* knowledge as a guide to further advance. It is for this reason that the knowledge institutions—universities, research laboratories, technological institutes, and the like—become increasingly the primary institutions of the post-industrial society. The strength of a society becomes increasingly dependent on the quality of its research and scientific effort.

For this reason, too, "human capital" becomes strategic. A post-industrial society requires larger numbers of mathematicians, physicists, engineers, economists, and highly technically trained persons. In the next several decades, the scarcest resource in the country will be the supply of talent. Hence our growing emphasis on the fact that talents are not evenly distributed among the population today. And our growing concern that some talent is lost because the children of the poor and the blacks do not have the opportunity to realize their potential and because elementary and secondary school instruction is of poor quality.

In the post-industrial society, there will be new modes of decision-making based on "intellectual technology." If technology is defined not just as machines but as a rationalistic attempt at problem solving, using machines, then the new intellectual technology—systems analysis, simulation, decision theory, linear programming, stochastic models—based on the computer will become increasingly important in the analysis of problems and the laying down of alternative solutions.

And finally, in a society geared to rapid change and to a more rational statement of alternatives, government will have to become more "future-oriented." No longer can any society afford to have problems pile up on themselves in helter-skelter form, as we see today—the spoliation of the physical environment, the failure of our inner cities, the shortage of higher education, the demand for health services. There must be a systematic "national estimate" of future needs and problems, a statement of available resources, a specification of priorities, and a coordinated set of national goals which attempt to realize the aspirations of a people.

The Utopian Vision: The Scientist as Messiah

In a post-industrial society, what is the social role of the man of knowledge? With the conception—historically a very ancient one going back, of course, to Plato—that knowledge entitles the philosopher or scientist to rule, what is the place of the scientist or technologist in the new society?

The seer who has most vividly formulated a ruling role for the scientists—he called them "the new samurai"— was H. G. Wells. In *The Shape of Things to Come,* written almost 40 years ago, Wells pictured a war-wasted world where crudely-clad Neanderthalers fought with club and spear among the mute ruins of a run-down technological civilization. Out of the air come gleaming ships containing

glitteringly dressed scientists who, having retired some decades before to some remote Eurasian wastes to build a new, rational civilization, now are able with super-weapons of their own invention to impose universal peace on the bickering nations of the world. (And the novel ends as the next generation of scientists prepare to go to the moon.)

Few scientists have had, at least publicly, such an intense messianic vision of their role. Perhaps the outstanding one was that extraordinary busybody of a genius Leo Szilard. In his fascinating memoirs, Szilard relates that while in Berlin in 1932 he read a book by Wells called *The World Set Free,* written in 1913, in which Wells predicts the discovery of artificial radioactivity (which he places in 1933, the year in which it actually occurred) and proceeds to describe the liberation of atomic energy, the development of atomic bombs and a world war fought by England, France, and America against Germany —in 1956—in which all the major cities of the world are destroyed by atomic bombs.

A year later, as a refugee in England, Szilard recalled that a speech by Lord Rutherford who said that the liberation of atomic energy on an industrial scale was moonshine, led him to think of Wells, and the possibility of the emission of neutrons and of a self-sustaining chain reaction. The idea of such a chain reaction so dominated his thinking that in 1934 he was able to apply for a patent which described the laws that could govern such a chain reaction. Having read Wells, and fearing that the knowledge would become public, he assigned the patent to the British Admiralty in order to keep it secret.

When Lise Meitner reported on the significance of the Hahn-Strasseman experiment in uranium fission, Szilard was among the first to realize its possibilities. He participated in the first explorations of chain reactions at Columbia in 1939. He initiated the letter to President Roosevelt (through the mediation of Albert Einstein and Alexander Sachs) which led to the Manhattan Project and the technology of the atom bomb. And when the bomb was successfully tested, he took the lead in Chicago, using James Franck as the sponsor, in the unsuccessful effort to dissuade the government from using the bomb against the cities of Japan.

After the war, Szilard was active in the nascent scientist effort to wrest control of atomic energy from the military. He organized a political lobby to influence Congressional opinion and in a fantasy, *The Voice of the Dolphins* (1960), he spelled out a new Wellsian vision of the messianic role of the scientist. In this fantasy a group of American and Russian scientists claim to have learned how to communicate with dolphins, whose larger brain capacities suggest a superior intelligence, and to obtain from these dolphins solutions of various biological problems which result in the winning of Nobel prizes and the development of commercially feasible processes which accumulate large royalties. Of course there is no such communication. The dolphin plan has been necessary to mask the pooling of American and Russian scientific effort by men who, sacrificing personal fame, are able to accumulate large sums of monies which now become used for political purposes, largely to buy out corrupt politicians. This political movement, centered in an institute named *Amruss,* finally succeeds in forcing the world powers to disarm by 1988.

Whether such a single-minded messianism still lurks in the minds of any prominent scientists today is difficult to say. Certainly it is nowhere publicly expressed. It was a mood produced by the effulgence of the postwar decade in which guilt and hope mingled in the minds of the scientists who had been associated with the atom bomb project, and which ended largely in the counterattack against a number of the scientists by the military which culminated in the Oppenheimer case. The Pugwash Conference, which began somewhat in the image of Szilard, has now settled down into a routine exchange of views between scientists and has become more an instrument of national policies than a completely autonomous movement of scientists—a de-

"The crucial point about knowledge today is that it is a strategic resource; and...the question becomes, who will control it, who will make the necessary decisions about allocations?"

velopment which arises out of the integration of science and government. Only Jerrold Zacharias seems to maintain the reforming zeal, but he does it largely in the more neutral—and perhaps pliable—area of education than in international affairs. Messianism in science is, for the moment perhaps, at its nadir.

The Technocratic Vision: Knowledge as Neutral

One of the prophets of the coming age was the wildly brilliant, almost monomaniacal, technocrat, le Comte de Saint-Simon. This visionary, writing in the first decades of the Nineteenth Century, coined the word *industrialism* to designate the emergent society wherein wealth would be created by production and machinery rather than be seized through plunder and war. In the new society, a natural elite—the engineers—would organize affairs in a rational, positivist fashion, for the methods of industry were the methods of order, precision, and certainty rather than of metaphysical thought. In this society, ordered by function and capacity, "the real noblemen would be industrial chiefs and the real priests would be scientists."

Society, said Saint-Simon, inevitably would be divided, but along the axis of talent; yet men would accept their place as a principle of justice. The division of labor meant that some would guide and others would be guided. In a society organized by function and capacity, doctors, engineers, and chemists would employ their skills according to objective needs, and they would be obeyed not because they were masters but because they had technical competence; to be obedient to one's doctor is, after all, a rational act.

This theme of "objective criteria" and "technical determination" became the overriding philosophy of the man who, probably more than any other, is the founder of the principles of organization of modern industry, Frederick W. Taylor. Taylor, as the founder of scientific management, was probably most responsible for the translation of technocratic modes into actual practices of industry, in which the notion of "ends" was tied up with the idea of "efficiency." Taylor believed strongly that "status must be based upon superior knowledge rather than nepotism and superior financial power," and in his idea of functional foremanship he asserted that influence and leadership should be based on technical competence rather than on any other criteria.

Out of Taylor's reflections (and his own compulsive character) came the idea of scientific time study and, more broadly, the measurement of work—for it is with the measurement of work and the idea of unit cost rather than with the introduction of the factory as such that modern industry gains distinctive meaning as a new way of life. By setting "scientific" standards Taylor felt that he could specify the "one best way" or the "natural laws" of work, and so remove the basic source of antagonism between worker and employer—the quest of what is "fair" or "unfair." Once work was scientifically plotted there could be no dispute about how hard one should work or the pay one should receive for labor—"as reasonably might we insist on bargaining about the time and place of the rising and setting sun," he once said.

The technocratic vision, as embodied in Saint-Simon and F. W. Taylor, assumed a society of social harmony in which all men would accept the single value of economic output and the meritocratic principle of allocation of position and place in the society on the basis of talent and achievement. But what was singularly obvious to those men is no longer so clear or persuasive today.

While economic growth and rising productivity are *conditions* for a rising standard of living, they are not ends in themselves—nor do they tell us how the product should be divided. Questions—whether increased output should be taken in the form of more goods or of fewer hours worked (and in what proportion); whether such goods should go to increase private consumption or become public goods; how much in public expenditures should be spent for

science and research, education, health, urban development, and the like—involve not only technical dimensions of costs and benefits but social values and principles of distributive justice as well. And, on the mundane level, they involve changes in the power and status of entrenched and disadvantaged social groups. The technocratic competence, at its best, is a statement about efficient means. In itself, it is no guide to ends; and that is what the balance of knowledge and power is all about.

Knowledge and Power: A Balance?

The crucial point about knowledge today is that it is a strategic resource; and, as with all resources, the question becomes, Who will control it, who will make the necessary decisions about allocations?

One mode, which was characteristic of the decisions on strategic defense policy in the initial postwar decade, was the hidden struggle between technical elites, in particular between an influential group of scientists and a wing of the military. Two issues were involved—one the construction of the H-bomb, the second the creation of a continental air defense. On the H-bomb, the scientists, in overwhelming number, largely the members of the General Advisory Committee of the Atomic Energy Commission, initially opposed the H-bomb. The debate was straightforward and the scientists' group lost. But a second, more diffuse, issue was involved. A group of scientists claimed that a continental air defense system was technically feasible and politically desirable, and that if one was constructed it could make the United States invulnerable so that negotiations with the Russians could be opened from strength. The Strategic Air Command, which flew the big bombers, argued that no defense was possible and that the only security of the U.S. lay in the threat of massive, crushing retaliation. That war between the scientific and military elites was conducted in the labyrinthine corridors of Washington. In the bureaucratic struggle, the scientists at M.I.T.'s Project Lincoln finally wangled some support for experiments which showed that a radar net and an early warning system (the D.E.W. line) across the Arctic was possible. And another group demonstrated that tactical atomic weapons were possible and that, theoretically, the U.S.—at least in its forward strategy, such as in N.A.T.O.—need not be solely reliant on "massive retaliation."

Most of this is now dated history. The revolutions in military technology, particularly the rise of intercontinental ballistic missiles, vitiated the "big bomber" doctrine of S.A.C. as it eroded the hopes of the scientist group regarding an impregnable defense. The point of this is simply that the arena in which these debates took place was incredibly confined and, for a long period, almost completely secret; only a few hints appeared in some selected media as one or another of the groups sought the support of some specialized audiences. Equally important, the debate was conducted on both sides largely on technical grounds, although the issues, at bottom, were political; the technical arguments, consciously or otherwise, masked or obscured the political considerations.

Because the debate was not conducted openly, the reprisals were indirect and, when they became known—as in the Oppenheimer case—almost entirely confusing to the public. The basis of the charges against Oppenheimer—that in the late 1930's he had been sympathetic to some Communist causes—had long been known to security agencies, and their efforts to eliminate Oppenheimer from the Manhattan Project had been overruled by General Groves. But the real inspiration for the subsequent actions, as is evident from the testimony before the hearing panel, came from the Air Force generals who resented Oppenheimer's influence and who drew sinister conclusions from his political stands.

The Oppenheimer case is now long past, a shameful instance of national folly; the specific strategic issues are now outmoded. But the small scientific community—whose members, drawn from a few university centers, knew each other intimately—is now greatly enlarged. It is difficult today to find any overriding issues on which "*the* military," and "*the* scientists" divide monolithically. (Even in the strategy debates in the early 1950's some scientists supported the military position, though the overwhelming number of "the elders" were opposed.) The arena of debate has been widened and become more open, and the political implications of any position are now more clear and take priority.

The elites themselves have become enlarged, and such growth makes it more difficult for any community to act with a single voice or a single interest. The scientists, in fact, have become more of

a constituency than a community; and while there are broad needs (particularly financial) which could unite its members, by and large—like business or labor or farmers—while united on a symbolic basis on specific questions the scientists include many internal and cross-cutting divisions.

The Role of Political Rationality

In an open and democratic society, based on the principle of representation, the crucial decisions on the use of knowledge for national purposes necessarily have to be settled in the political order and by the political representatives who sit in that order. Many individuals are impatient with such a system. Szilard, for example, once remarked that when scientists talk to each other, the question they ask is, Is it true? The politicians, on the other hand, ask, *Why* do they want it? Yet, in a multi-group polity, the latter question makes necessary sense, for it is a kind of "political rationality" which seeks to assess the array of contending forces and come to an accommodation without polarizing the society or inviting disruption.

Any balance of knowledge and power has to take into account an economic rationality, which may be defined as seeking the "ratios of efficiency," and a political rationality, which defines a "ratio of displacements." Take a seemingly "technical" example. One can construct a "transport grid" between Boston and Washington by setting up an "operations research" problem in these terms:

Carriers	Items to be moved	Distances	Times
Airplanes	Persons	Long	Fast
Railroads	Bulk goods	Intermediate	Intermediate
Trucks	Intermediate goods	Short	Slow
Buses			
Private cars	Small goods		
Barges			

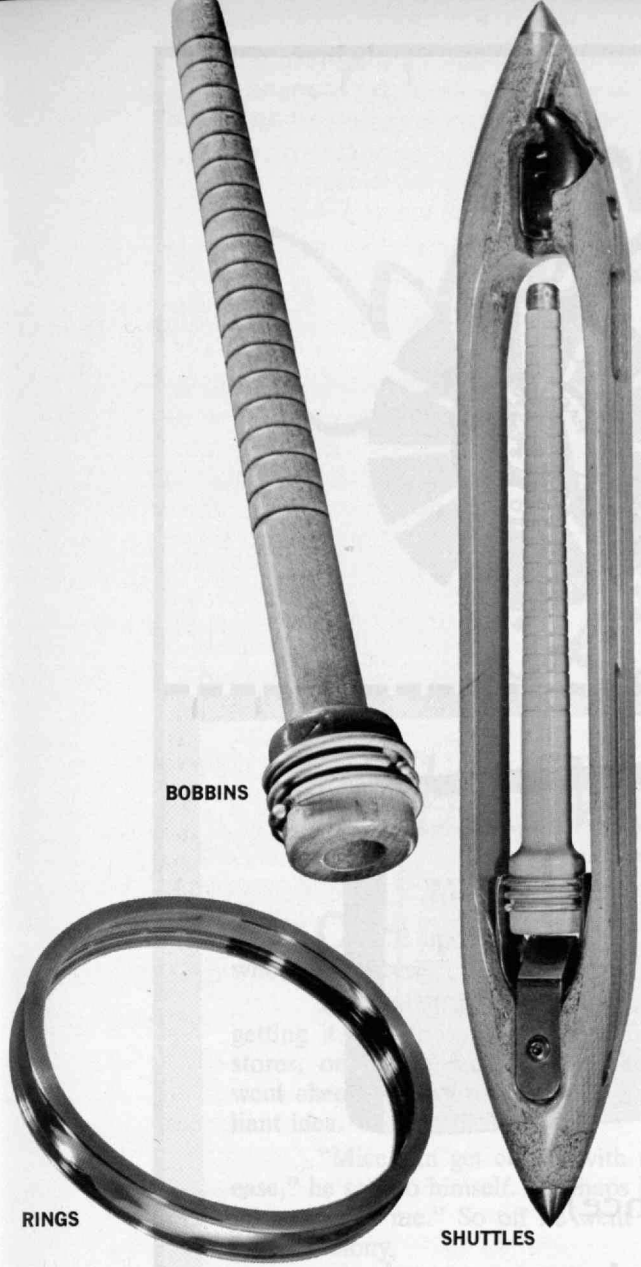
Given the data we could assemble about the flow of traffic over those 500 miles, the problem would then be: Which would be the most efficient "mix" at what costs? The norms of economic rationality might dictate a specific mix, yet the resultant plan might, in consequence, disrupt traditional neighborhoods, (e.g., by the network of roads), place undue tax burdens on particular communities, and the like. Political rationality, to the extent it can be measured, would indicate the ratio of displacements (and the attendant economic and social costs) to the efficiencies gained. Any decision has to reflect the balances of each.

But these decisions cannot only be reflections of the relative power of advantaged and disadvantaged groups. Any set of decisions are embedded in a matrix of values, and one of the functions of knowledge is to clarify these values: by spelling out the consequences, economically and socially, of the various choices, and by relating the various choices to one another so as to see what principles of justice are involved.

Technical knowledge cannot specify the ends, but it can widen the options. The social map of America, since the end of World War II, for example, was reshaped by the rise of suburbia. Most Americans, for differing reasons, clearly desired to own their own homes. Yet such a decision was possible only by the tax and credit policies of government. Mortgages were insured, veterans needed only to put down a very small capital payment, interest costs became deductible from taxes. But the pattern of housing arrangements was made largely by developers and builders; and nowhere was there an awareness or an assessment of the additional social costs of such changes—the costs of new services such as schools, water, police, roads, and the like. Yet government policy underwrote those choices. It would have been possible, for example, not to accept such a choice uncritically but to sketch alternative patterns: some communities (in simulated models) could be built as single-unit detached homes, with one pattern of land usage and costs; another could be constructed in "cluster" style, as semi-attached houses, permitting a different use of common lands for recreation or other purposes; and a third could have been high-rise units in the suburbs, with larger open spaces. Each of these would have generated different social costs. It may well be that, in the end, the American people would have chosen the pattern they did, but then, at least, it would have been done more consciously than in the past and with an awareness of the costs and consequences.

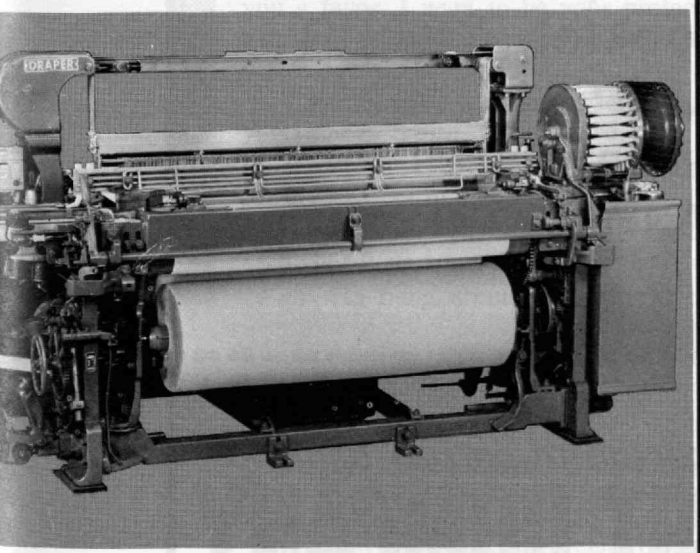
This, then, is the balance of knowledge and power: to spell out the technical components and the dimensions of cost; to widen the options and to specify the moral context of choices so that decisions may be made more consciously and with a greater awareness of responsibility. It is in the interplay of the technical and the moral that rationality has to be sought.

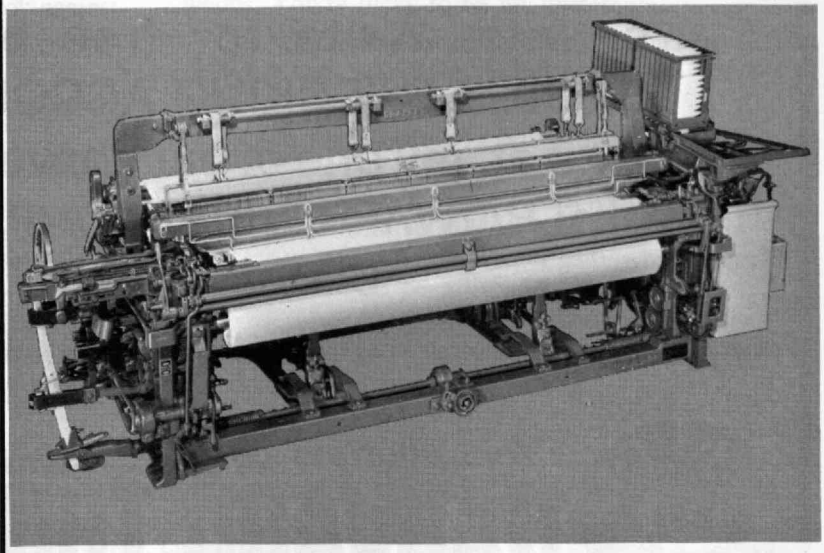
Daniel Bell is a graduate of City College of New York and Columbia University, where he first became interested in sociology through a student job with the International Ladies Garment Workers Union. Thereafter he was successively Managing Editor of New Leader, *Managing Editor of* Common Sense, *a member of the University of Chicago faculty, Labor Editor of* Fortune, *and a member of the Center for Advanced Studies (Princeton) before joining the Columbia faculty in 1959. He is director of a Columbia University program to examine the role of science and technology in social change, Chairman of the Commission on the Year 2000, and now co-chairman of a government panel preparing a prototype of a Social Report of the President, the first report ever made on the social state of the Union.*



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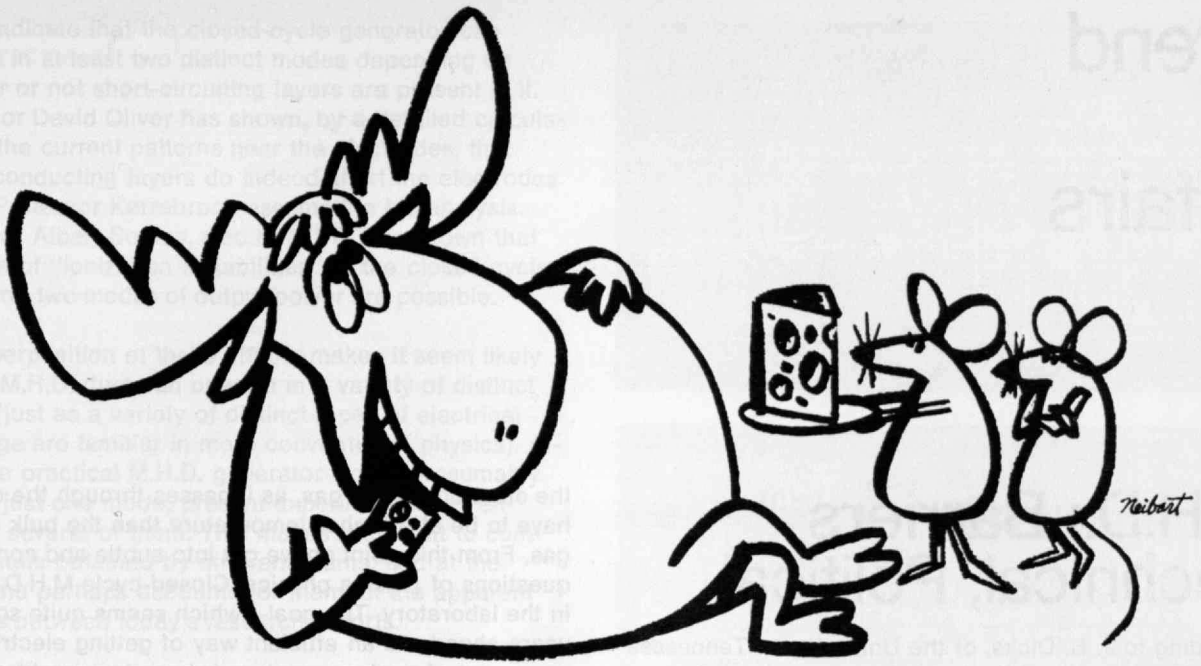
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The Moose and The Mice

ONCE upon a time, there was a Moose who liked cheese.

But, being a Moose, he had a hard time getting it. A Moose can't sneak into houses, or stores, or cheese factories. So the poor Moose went cheese-hungry until, one day, he had a brilliant idea.

"Mice can get cheese with the greatest of ease," he said to himself. "Perhaps I can get some mice to help me." So off he went to the nearest Mouse colony.

"Look, Mice," he said. "I've come to do you a favor. I want to be your protector against cats and foxes and any other varmints that trouble you."

The Mice were interested. "But what do you want in return?" they asked.

"Cheese!" said the Moose. "You can pay for my services in cheese."

"Cheese! That's a breeze!" cried the Mice. "Go ahead; start protecting." So the Moose did.

He hung around the Mouse colony and whenever a cat or a fox or a weasel appeared, the Moose ran him half-way out of the county. The Mice were grateful and happy, and they paid off the Moose with huge quantities of the finest Cheddar and Roquefort and Gorgonzola. The Moose ate and ate, and grew and grew, and before long he was so fat and lazy that all he wanted to do was to eat and sleep. Naturally, his protecting went to pot.

The Mice began to complain. "We're your *customers,*" they protested, "but you treat us like bill collectors. Get on the job and give us some service!"

The Moose snorted disdainfully. "You *need* me," he told them. "I'm the Big Wheel in these woods. You're *lucky* to be my customers!"

"Oh, yeah!" cried the Mice. "Don't try to be a big deal when you're full of cheese. We're taking our business elsewhere!"

So the Moose was left without a market. To get cheese, he had to take employment with a cheese merchant, who sawed off his antlers to make him look like a horse and put him to work pulling a cheese wagon. And, instead of getting prime ripe cheese, he had to be satisfied with the rinds and scrapings of cheeses that had spoiled.

MORAL: It's all right to grow big provided your *head* doesn't!

In today's complex electronics industry, a company must be big! For only bigness—in research, production, and distribution—can bring customers the technical services they need. But bigness hasn't gone to our heads. We haven't lost the personal touch that helped us grow. Close attention to customers' needs is still primary with us.

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Trend of Affairs

M.H.D.: Barriers Technical, Political

According to J. B. Dicks, of the University of Tennessee Space Institute, the U.S. electricity generating industry could be saved $80 billion by the end of the century, by using the technique known as M.H.D.—magnetohyrodynamic—power generation. The obstacles are not technical, he said, but political. Outside the laboratories, there is not enough faith in the process for the necessary development funds to be provided.

This is generally true also in Europe, but in Russia the position is quite different. The Russian government has been persuaded by the arguments of its M.H.D. engineers, and practical power plants are going ahead. One recent Russian paper was devoted to variants of the basic M.H.D. system giving net efficiencies ranging from 55 to 59 per cent, at an electrical power output of around 800 MW.

The central principle of M.H.D. power generation is that when a stream of electrically conducting gas crosses a magnetic field, a current appears in it and can be collected from electrodes placed on either side of the gas stream. The promise of this technique is that it should be more efficient than the conventional turbo-generator system. Besides, since it uses no moving mechanical parts, it should be possible to run an M.H.D. generator at higher temperatures than turbine blades will tolerate. There are two distinct ways of going about it.

The successful way, so far, is known as "open-cycle." Hot gas from the combustion of a fossil fuel is passed once through the M.H.D. duct, and then leaves the system, possibly via a conventional turbine (since it is now cooler) or a heat-exchanger in which it pre-heats the combustion air. The gas in the M.H.D. duct is conducting simply by virtue of its temperature. Chemically, it is a ferocious mixture, and the main technical problem is (or was) to find sufficiently durable materials for the duct.

To get M.H.D. to work at lower temperatures, where gases are not naturally highly conducting, requires that it be "seeded" with some easily ionized material such as cesium. This leads to the need to re-use the gas, which therefore is circulated in a closed loop. In effect, the electrons in the gas, as it passes through the duct, have to be at a higher temperature than the bulk of the gas. From this point on we get into subtle and complex questions of plasma physics. Closed-cycle M.H.D. is still in the laboratory. The goal—which seems quite some years ahead—is an efficient way of getting electrical power out of nuclear reactors (whose temperature is strictly limited by nuclear fuel technology).

Current progress was described late in March at M.I.T.'s Kresge Auditorium, where the 10th Symposium on Engineering Aspects of Magnetohydrodynamics was held. This annual meeting is national in origin and geography, but is in favor with M.H.D. workers from all parts of the world, and the three-day gathering featured a large proportion of foreign papers, 10 of them Russian (including the efficiency comparison referred to above).

Two of the most significant "closed-cycle" type M.H.D. experiments in the U.S. are those at the General Electric Company's Space Sciences Laboratory (King of Prussia, Pa.) and at M.I.T. Both operate at powers of hundreds of kilowatts, although only for short periods. The G.E. apparatus, according to a paper by B. Zauderer and E. Tate, has actually succeeded in generating 600-700 KW of power, which is about nine per cent of the thermal power of the gas input. In this experiment the gas is generated by a shock-tube—it should be understood that at the present stage of the game, "closed-cycle" experiments do not actually feature closed cycles, but merely try to simulate conditions that might arise in conceivable cycles, some time hence. There is considerable debate as to whether results obtained with very brief bursts of shocked gas are relevant to real, continuous-flow situations. The G.E. authors hold that their test time of five milliseconds "was sufficient to produce quasi-steady state conditions."

The M.I.T. approach has been to work with continuous flow gas conditions such as might very well be generated in a nuclear reactor. It appears that a few hundred kilowatts has been removed from the gas, but has not actually appeared as electric power. Apparently the system is being short-circuited by the presence of highly conducting layers of gas along the duct walls. These layers are generated by strong ohmic heat dissipation near the electrode walls.

Analyses performed by Professor Jack Kerrebrock of

M.I.T. indicate that the closed-cycle generator can operate in at least two distinct modes depending on whether or not short-circuiting layers are present in it. Professor David Oliver has shown, by a detailed calculation of the current patterns near the electrodes, that highly conducting layers do indeed short the electrodes out as Professor Kerrebrock assumed in his analysis. Professor Albert Solbes, also of M.I.T., has shown that because of "ionization instabilities" in the closed-cycle generator, two modes of output power are possible.

The superposition of these effects makes it seem likely that an M.H.D. duct can operate in a variety of distinct modes (just as a variety of distinct types of electrical discharge are familiar in more conventional physics). Although a practical M.H.D. generator would presumably employ just one mode, present experiments may encounter several of them. This makes it difficult to compare results obtained by different teams, and at the same time perhaps accounts for many of the apparent conflicts between today's research reports.

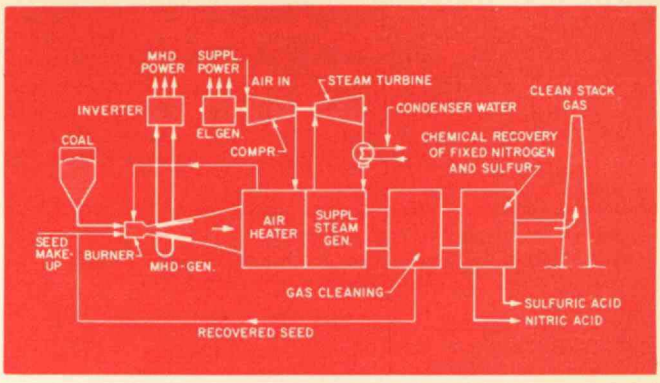
Rail Freight's Potential Revival

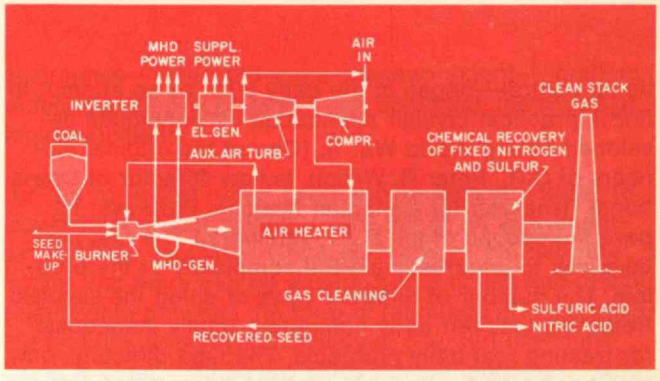
The railroads' share of freight transport has remained nearly constant for about 10 years, if we take as a measure the percentage of the total tonnage of intercity freight (around 40 per cent). If instead we choose the dollar value of goods carried, the railroads' share is not much above 20 per cent and seems to be declining by about 1 per cent each year. But proper analysis and control could reverse this trend, says A. Scheffer Lang, Visiting Professor of Civil Engineering at M.I.T., who was in Washington as Federal Railroad Administrator until February.

Indeed, the railroads' dollar share might even double, for there seems to be no future development in highway transport that could compete with a truly organized rail network. Professor Lang studied at M.I.T. and was for five years a member of the faculty before his Washington appointment. He returned to the Department of Civil Engineering this spring to organize a seminar series on "systems analysis in railroad transportation."

For the bulk of intercity freight, Professor Lang says, rail is competitive in price and (as often as not) in journey time. The trouble is, of course, that journey times are unreliable, which is a primary factor to most freight clients. Professor Lang gave a graphic picture of where this unreliability comes from—overworked yards where the car with a low priority may be neglected for days; the difficulty of getting an empty special-purpose car through the system and home for its next job; the trials of the loading-yard supervisor who may need a particular one of perhaps 50 different types of car, and has to retrieve it from a railroad network that treats all types as the same.

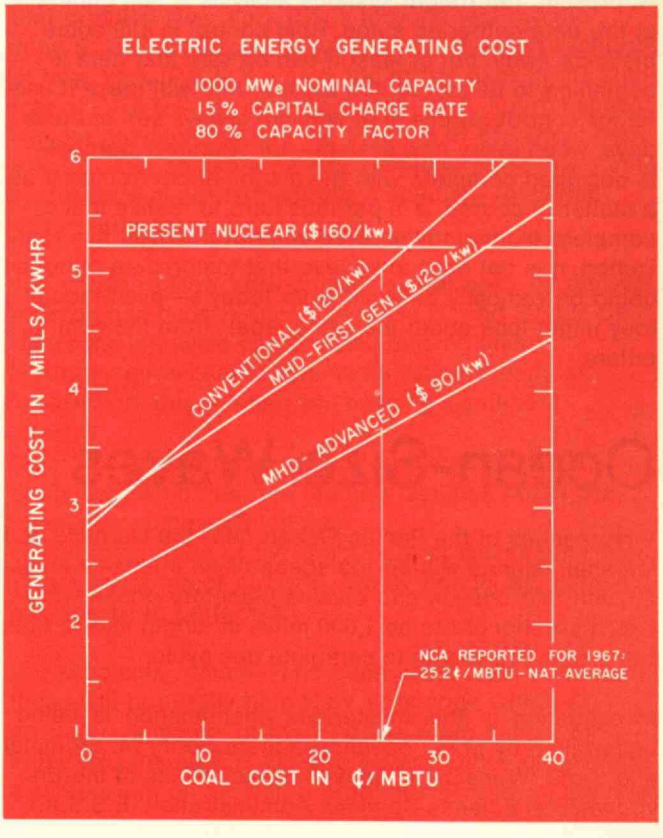
Railroad operational research—aiming to bring the enormously complex supervisory problems under ra-





Above, two possible "open-cycle" M.H.D. power systems: in the first, the hot gas from the M.H.D. duct preheats the burner air and also generates steam, which passes to a turbo-generator to supplement the M.H.D. electrical output; in the second, the steam turbine is replaced by a gas turbine (from a paper by F. Hals and W. D. Jackson, of Avco Everett).

Below, a Soviet view of the economics of power generation systems for various coal costs (from a paper by A. E. Sheindlin, of the U.S.S.R. Academy of Sciences' Institute for High Temperatures, and others).



tional control—began in the early 50's, as an attempt to find a practical civilian application of techniques developed during World War II. (One of the original pioneers of O.R., Peter B. Wilson, is now Director of Operational Research for Canadian National Railways; he gave the second of the M.I.T. seminars.) The first mistake was to underestimate the complexity of the problem. The number of different ways of doing the simplest freighting task left early computers totally inadequate for treating real daily problems. The next difficulty, only now beginning to diminish, was the "data bankruptcy" of rail systems. It was impossible to get hard figures to put into a computer simulation. And the word "simulation" conceals another of the early difficulties: a deterministic approach to rail systems, as they are today, does not work. Although in principle one might expect the location and load of every car to be knowable, in practice it is necessary to use probabilistic "Monte Carlo" methods (such as are used to model the random passage of neutrons through a reactor.)

At present, rail freight systems analysis is still generally at the data-gathering stage. Real control is still some distance away, but at least it can be said that data is beginning to be stored in a manner that will make it useful for control purposes (it was not always so). In these days, when every new system—for whatever purpose—is designed complete with the means of controlling it as a matter of course, it is perhaps hard to realize that a complete technology evolved without it. Given this realization, it is not hard to believe that tomorrow's railroads could be radically different from today's—even though they might look about the same, apart from the computers.

Ocean-Size Waves

Vast reaches of the Pacific Ocean near the Caroline and Marshall Islands will be the scene of an intensive investigation into unseen and elusive planetary ocean waves, which are thought to be 1,000 miles in length and to take two weeks to a month to complete one cycle.

Investigation of this mysterious phenomenon is being undertaken by M.I.T. oceanographers Henry M. Stommel and Carl I. Wunsch, along with Steacy Hicks of the Environmental Science Services Administration (E.S.S.A.).

Planetary waves are believed to be caused by the gravitational attraction of the sun and moon. Once initiated, however, the waves are apparently largely governed by the depth of the water, by weather, and by the effect of the earth's rotation.

The existence of planetary waves was established in the present decade, primarily through work done by Professor Wunsch. He studied data from recordings taken all over the Pacific, but results were inconclusive, partly because the length of the waves makes them hard to detect. "This organized effort will give us much more reliable results," explained Professor Wunsch, "but we still have a problem because there is more than one type of planetary wave. Some are caused by tides and some by weather. The weather waves are hardest to detect because they are so erratic."

Investigators hope to discover whether the waves move across the ocean or oscillate in one area, how high they are, and how significant. "We believe that they may have the same dynamics as planetary waves in the atmosphere," said Professor Stommel. These planetary waves, which were discovered by the late Carl-Gustaf Rossby of M.I.T., serve an important function in governing changes in the weather. Might planetary waves in the oceans have such an influence on the underwater world?

Planetary waves are believed to exist in all oceans, but the Pacific is particularly well-suited for the study because of the easily accessible islands and calm weather. The waves will be measured on tide gages located at Guam, Truk, Eniwetok, and Kwajalein, and other gages will be set up over the next year at 11 different islands in the Carolines and Marshalls.

The data collected by the gages over four years will be analyzed by computers at E.S.S.A. and M.I.T. Professor Stommel noted that, "Hopefully, knowledge of planetary-wave dynamics will become an important part of a theoretical model of the ocean which will greatly increase our understanding of the ocean environment."

. . . and Underwater Waves

Professor Wunsch is also chief scientist of an M.I.T. group which has placed a six-mile cable deep in the Atlantic Ocean to study towering underwater waves that distribute energy throughout the world's oceans.

Numerous kinds of geophysical events such as earthquakes and volcanic eruptions create energy which takes the form of massive columns of water washing over the irregular ocean floor. Natural processes require equilibrium in distribution of this energy, and underwater waves, some 150 feet high, may be one of the primary transport mechanisms that carry energy throughout the ocean.

The cable, running at a depth of 2000 feet off the south-

east coast of Bermuda, is equipped with three widely spaced sensors that detect changes in temperature as small as .01 degree Centigrade. A study of the temperature variations of the three instrument packages indicates the size, speed, and direction of a wave. The instrument packages were designed and built at the M.I.T. Instrumentation Laboratory.

The cable, which is five-eighths of an inch in diameter, is covered with steel armor to protect it from fish bites and a polyethylene jacket to retard corrosion. The first three miles of the cable are on the ocean floor while the other three are anchored and equipped with 2,000 floats to keep the cable at 2,000 feet when the ocean floor drops deeper.

According to Professor Wunsch, the present system will yield data for about a year and contribute to man's understanding of how the ocean works at depths which have never before been probed with accuracy.

The Human Essence

Linguistics is at once the most fascinating and the most frustrating science. Despite our sophisticated tools of analysis and much progress in using them, Noam A. Chomsky, Ward Professor of Linguistics at M.I.T., told the 1969 Nobel Conference of Gustavus Adolphus College this winter, "We remain as incapable as ever of coming to grips with the core problem of human language, which I take to be this: Having mastered a language, how is one able to understand an indefinite number of expressions that are new to one's experience; and . . . how is one able also to produce such expressions . . . to be understood by others who share this still quite mysterious ability?"

Some descriptions of language and its content are helpful; for instance, said Dr. Chomsky, the difference between "deep" and "surface" structure. "John is certain that Bill will leave" is fundamentally different from "John is certain to leave," though the form of the two is similar. But "That John will leave is certain" has only superficial ("surface") differences from the second sentence above. Deep structural differences, said Professor Chomsky, have to do with "the grammatical relations of predication and modification," while surface structure determines—at least to some unknown extent—"matters of focus and presupposition and comment, the scope of logical elements."

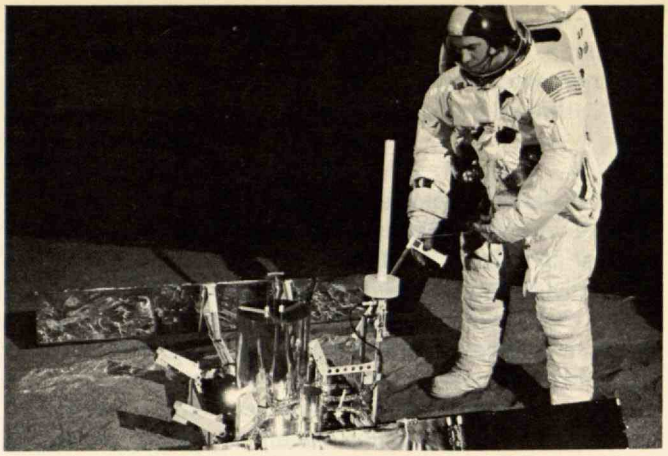
But the rules that relate deep and surface structures to representations of meaning "are not at all well understood," said Professor Chomsky. Indeed, he said, the notion that there can be established a cause-and-effect relationship between the form of language and its meaning remains a highly controversial one. But the challenge is clear: "When we study human language," said Professor Chomsky, "we are approaching the 'human essence'—the distinctive qualities of mind that are, so far as we know, unique to man."

Airport Hurdles—Behind and Ahead

Though he claims no long-term victory over the forces that crippled New York City's airports last summer, John R. Wiley, Director of Aviation for the Port Authority of New York (P.A.N.Y.), says the hectic days in the summer of 1968 will not be repeated in 1969. Four changes —none of which, he told the Institute of Electrical and Electronics Engineers national meeting early this spring, represent a major technological solution—give him this assurance:

1. The use of New York commercial airports by general aviation has been reduced between 20 and 30 per cent under the influence of increased landing fees.
2. Airline agreement to voluntarily ration schedules to New York this summer will have "a significant effect."
3. Air taxi operators are rapidly converting to STOL equipment which utilizes landing facilities not in use by regular commercial flights.
4. The integration of the flight control systems for New York's three major airports, barely begun last summer, has now been perfected.

But problems remain—and such short-term solutions as these will not really help New York cope with the air traffic demands of five and ten years hence, Mr. Wiley told the I.E.E.E. He and several other speakers at a symposium on air traffic problems agreed on the need



Mock deployment of the Passive Seismic Experiment. The P.S.E. itself is the cylinder; flanking it are two solar panels; the vertical rod is a communications antenna, and the small cylinder is an isotope-powered heater.

for fundamental changes and innovations at every stage of the air transportation process.

One such plan was reported by Louis Achitoff, Chief of the P.A.N.Y.'s Aviation Service Technical Division. Having shown that induction loops in taxiways and aprons can detect the presence of aircraft, P.A.N.Y.'s Technical Division is now requesting proposals for computer logic, display and associated elements to complete a surface traffic control system (STRACTS) for John F. Kennedy Airport which will govern automatically the movement of aircraft between apron and runway. The system is needed, Mr. Achitoff told the I.E.E.E., because of the increasing volume of traffic at the airport and because of the large planes which will soon be using it. The larger aircraft will take more space, reducing clearances, and the structures to service them will be so high as to block control tower vision to taxiways.

The Little Red Hen

Even while one of their colleagues (*see above)* was proposing an imaginative new system for controlling aircraft on the ground at congested John F. Kennedy Airport, several hundred members in the next room at the annual I.E.E.E. convention were expressing their frustrations with the social and political system which governs the usefulness of their work.

Somehow, said William K. Linvill of Stanford University, some way must be found to bring technology to serve the gravest national needs, to achieve rational decisions on technological applications of national scope. There must somehow be a way for many people to sense alternatives and so to participate in true decision-making.

Who are the professionals who will help to evaluate the true promise of technology for society? asked Dr. Linvill, who began his engineering career as a student and later a teacher at M.I.T. The managers?—no, their decision-making depends too heavily on the profit motive. The economists?—they want to observe decision-making and its effects, not to participate. "Very well, then," said Dr. Linvill, "I shall do it myself. The reason I'm an engineer is because I have a desire to invent and to do —and I don't care if the problems are technological or social."

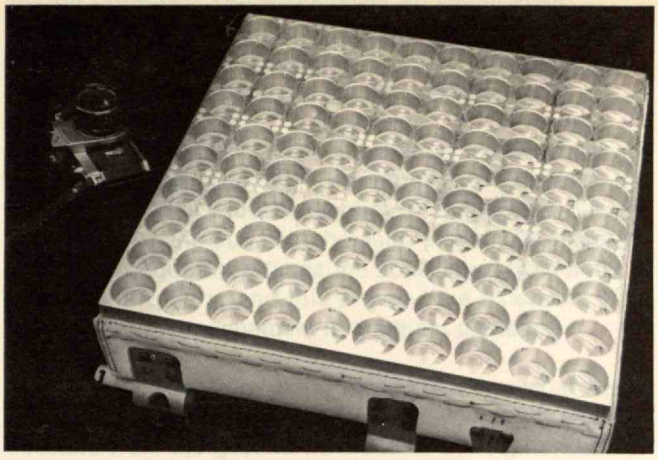
First on the Moon

No one expects the moon to provide a friendly human environment. But just how hostile it may be is dramatically revealed by plans for the experimental equipment which Edwin E. Aldrin and Neil Armstrong will deploy on the Lunar surface after their historic first landing from Apollo 11 in July.

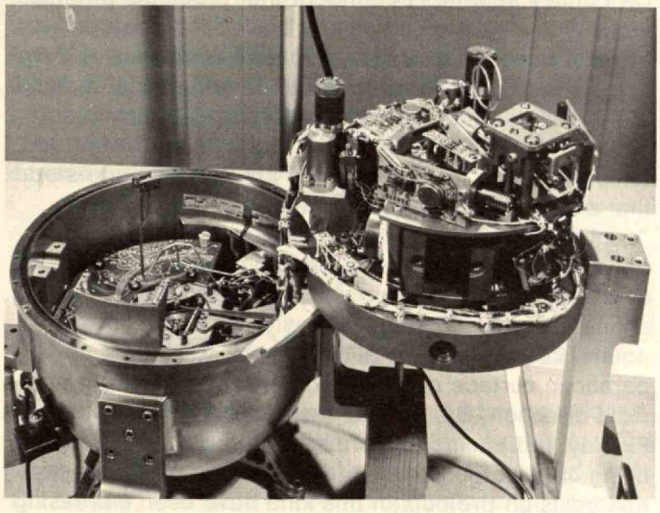
Two equipment packages will be carried in a special compartment of the Lunar Module—a laser reflector array and a passive seismic experiment. Each package, about the size of a large suitcase, will weigh on earth somewhat over 50 pounds—on the moon, about 10 pounds. The astronauts' assignment in connection with this equipment will be as simple as this: extend the carrier supporting one experimental package in the Lunar Module, lift the package off its support and carry it away from the Module at least 30 feet across the lunar surface, deploy the equipment by pulling handles and a few cords, and line up the equipment by checking the sun's shadow against a built-in compass; then repeat the process for the second experimental package. The total time required—except for the time to walk the various 30-foot routes to and from the Module—may be 10 minutes.

The astronaut will do these things in a bulky and awkward space suit, and simulation studies—supplemented by the experience of Gemini and Apollo astronauts—have suggested to N.A.S.A. that no more elaborate demands be made upon the first lunar visitors. Hence plans for deploying a complete Lunar Surface Experiments Package, a sophisticated geophysical station, have been deferred until a later Apollo mission, when more will be known about man's ability to work on the moon.

The simplest of the two Apollo 11 experiments is an array of corner reflectors which will simply return laser light beamed to it from Earth. Including sophisticated equipment for projecting and receiving the laser beam on earth, this system will provide "orders-of-magnitude" improvement in the precision of our knowledge of the distance between the earth and the moon. As a result, Carroll O. Alley of the University of Maryland, the principal investigator on the project, hopes for several important research results: it may be possible to demon-



This array of 100 "corner reflectors"—accurately formed prisms of synthetic fused silica mounted in aluminum retainers —will be placed on the moon by Apollo 11 astronauts; it will reflect in exactly the direction from whence it comes any beam of laser light falling on it. The equipment was developed by Arthur D. Little, Inc., as subcontractor to the Aerospace Systems Division of Bendix Corporation.



The Passive Seismic Experiment, containing vertical and horizontal motion sensers supplied by Teledyne and modified by Bendix, the manufacturers of the complete P.S.E. system.

strate that the Newtonian gravitational constant is in fact decreasing very slightly and so confirm the expansion of the universe; several factors in the theory of general relativity may be observed for the first time; accurate measurements over a long period of time—the reflector is designed to survive at least 10 years in the moon's environment—may demonstrate continental drift and other small motions of the earth and of its surface features; and slight aberrations in the rate of the moon's rotation, perhaps associated with its geophysical features, may be detectable for the first time.

The passive seismic experiment—an inherently much more complex system—consists of a simple seismometer (a suspended weight whose inertia holds it in place while the rest of the apparatus moves) to measure long- and short-period vibrations and movements of the lunar surface along vertical and horizontal axes. There are a data system to process and return seismic data to earth, solar panels to generate over 30 watts of electrical energy, and isotope heaters to maintain the temperature of the equipment during the cold lunar night.

Obviously, knowledge of earthquakes and other vibrations in the lunar surface will be of greatest importance to geologists trying to determine the geology and origin of the moon. Gary Latham of the Lamont Geological Observatory of Columbia University is the principal investigator on this experiment, and Frank Press, Head of the M.I.T. Department of Geology and Geophysics, is among the co-investigators.

Where from the Moon

After it establishes man's ability to land and move on the moon, N.A.S.A.'s number one problem will be how to balance its resources between the next two alternatives: development of space stations for research and development work, and further exploration of the moon itself. Both routes had their advocates among speakers at the annual convention of the Institute of Electrical and Electronics Engineers in New York this spring.

Wernher von Braun, Director of N.A.S.A.'s Marshall Space Flight Center, predicted "with some confidence" that development of a space laboratory would "pay for itself many times over" on the basis of its contributions to basic research as well as industrial processes. Such a laboratory's environment of weightlessness and high vacuum, said W. L. Jones, Director for Biotechnology at N.A.S.A.'s Office of Advanced Research Technology, would be without precedent in any research undertaking. Some problems in analytical chemistry would be immensely simplified. How about surgery under zero-gravity conditions? And some manufacturing problems —for example, making seamless, lightweight steel spheres—could be solved easily.

Though Dr. von Braun emphasized the need for work on artificial gravity systems for spacecraft, R. W. Cunningham, a N.A.S.A. astronaut, called on his Apollo 7 experience to declare that living under zero gravity presented some real advantages. There is no need to worry about the clearance around doors and through narrow passages: you simply float; if you hit a switch, nothing happens—because the force required to move the switch is greater than the force required to move the human. Nevertheless, said Mr. Cunningham, a true space laboratory will be different. Because of its greater size, the Apollo capsule gives astronauts their first chance to really "live" in space; heretofore, in Mercury and Gemini, it's been just "existing." What will it be like when the spacecraft is a laboratory ten times the size of Apollo?

Meanwhile, the moon, too, has its advocates as a research base for geophysical and astrophysical studies. The "back side" would be an ideal location for a radio observatory, said Kenneth Franklin, Assistant Chairman of the Hayden Planetarium. The moon has no iono-

sphere to reflect and filter radio signals, and the observatory would be shielded from man-made radio interference so that it could become truly a window on the radio universe.

If Jack S. Green of the McDonnell Douglas Corporation is right, most of the moon's surface is made up of volcanic rocks. Without exception in human experience, such rocks yield water—in minute quantities, he said; they also contain minerals which make them remarkably nutritious for plants, and they probably contain sulphur which could be used on the moon to make a waterless cement. The lunar climate presents problems, however, said William Kraft of the Space Systems Division of Hughes Aircraft Company. There is a 500-degree temperature difference between day and night, and building systems to withstand that temperature change—at a very rapid rate—will be complex at best.

Radio Astronomy: Future Uncertain

Advances in technology stand behind most of this decade's significant achievements in astronomy, but the U.S., where most of the technology originated, is on the verge of losing its leadership in this fast-moving field.

Four areas of rapid advance in astronomy were described before members of the Institute of Electrical and Electronics Engineers at their annual convention in New York this spring. Infrared astronomy (*see below*), long-baseline interferometry, solar radiometry (*see* Technology Review *for April, page 75*), and the detection of pulsars (*see* Technology Review *for January, pages 44-45, and March, page 57*) represent achievements impossible without significant inputs from technology, ranging from electronics and computation to structural engineering.

But the next steps to extend and build on these achievements—though the necessary engineering work is almost all behind us—are not being taken because our national priorities do not now include goals in radio astronomy, John W. Findlay, Associate Director of the National Radio Astronomy Observatory, said in New York.

Dr. Findlay said he is confident that problems of phase stability and time delay can be solved for large arrays of radio telescopes. Based on current engineering practice, he said, it is possible to build instruments capable of mapping a piece of sky of one degree of arc to an accuracy of one minute of arc. The effects of wind and temperature on large structures are so well understood that a 2500-ton radio telescope can be moved with "negligible friction" to directional accuracies of seconds of arc. Work is nearing completion on the design of a remarkable reflector which will deform under changes in the direction of gravitational pull so that points on the parabolic surface move to lie on a new parabolic surface of slightly different focal length and axial direction. But despite these developments, said Dr. Findlay, radio astronomy has for several years been living on developments of 12 years ago, while construction costs on projects of this kind have been increasing at about 9 per cent a year. "Unless we take some constructive steps soon," he said, "we shall run out of the kind of impetus we need—and the kind of radio astronomy you've heard about will not continue."

Infrared Anomalies

The most luminous bodies in the universe are not the stars that seem brightest in our night sky; they are, instead, a newly discovered group of "infrared galaxies" whose radiation is most intense in the long infrared wavelengths, F. J. Low of the University of Arizona told the annual convention of the Institute of Electrical and Electronics Engineers in New York this spring.

An example, he said, is the infrared nebula in Orion. Professor Low's observations indicate that the luminosity of this object is approximately 10^6 times that of the sun. It now appears, he told the I.E.E.E., that this object is "a cluster of protostars undergoing rapid evolution near the peak of their energy production."

Other observations of extragalactic objects show luminosities which range from several times that of our galaxy to several thousand times. "Thus," said Professor Low, "these objects appear to be the most luminous bodies in the universe, and they have the remarkable property that most of this energy is radiated in

the far infrared." The mechanism by which such amounts of infrared energy could be produced is not at all clear, he told the I.E.E.E., and indeed these observations present "fundamental physical problems."

There are other anomalies in Professor Low's observations of infrared radiation. The temperature of Mars, he said, agrees well with the amount of energy that planet receives from the sun. But, he said, there is an excess energy of about three times the solar input from both Jupiter and Saturn, and this proves "the existence of an internal energy mechanism in the giant planets."

The peak energy from the infrared stars comes at wavelengths between 50 and 100 microns, which are inaccessible from the ground because of atmospheric filtering. Professor Low is now using an infrared telescope designed and built at Rice University, carried in a N.A.S.A. aircraft to altitudes up to 50,000 feet, and from these airborne data combined with estimates from ground-based observations Professor Low has made "conservative estimates" of the total luminosity of several sources in the sky.

Panamanian Doubts on a Nuclear Canal

Excavating a second Panama Canal is often mentioned as an engineering application of nuclear explosives. The most obvious present obstacle is the 1963 Limited Test Ban Treaty, and there are now suggestions for broadening the interpretation of that treaty to permit such uses of nuclear explosions. But there remain other obstacles—more technological than political.

These relate to Panama's economy and to the special geological nature of the Isthmus of Panama, said Francisco J. Morales, Jr., at an M.I.T. seminar this spring. Mr. Morales, who studied civil engineering at the Institute, is president of a Panamanian construction company, and a consulting civil engineer.

Panama is a small country with few natural resources; its gross national product is about $500 million. This figure is so small, says Mr. Morales, that the work of building a second canal or radically modifying the present one (with the aim of permitting the rapid passage of ships larger than 50,000-tons) would constitute a major temporary aberration of the Panamanian economy. To avoid extremes of inflation and deflation, the work—whatever it is—should spread over a long period of time. The modification proposal would cause the least upheaval. The nuclear operation would be fairly rapid, with an irregular change of demand with time.

The nuclear excavation proposal raises two major technical problems—protection from fallout and prediction of serious geological hazards. The fallout question can presumably be settled by making a clean nuclear device and exploding it deep enough (although there is some disagreement as to how soon a clean enough device can be produced). But the geological problems are more complex. The ground through which the canal would be driven, says Mr. Morales, is liable to severe fracturing and sliding, so the final result of any nuclear excavation would be much shallower than the Atomic Energy Agency's experiments have been producing in Nevada. This does not imply that the nuclear approach is completely unfeasible, Mr. Morales observes. It simply means that the project might be far more costly than has so far been suggested. The present figure for a nuclear-dug Panama Canal is around $1.5 billion—cheaper than conventional schemes by perhaps $1 billion—but a reconsideration of Panama's "quick" geology might well remove this apparent advantage.

A Global Geology of the Earth's Crust

New research by Patrick M. Hurley, Professor of Geology, and his M.I.T. colleagues, based upon a massive compilation of data on the age and location of basic rock structures throughout every continent of the earth, has now established the geographical coherence of the earth's oldest rocks.

The result is impressive evidence that the continents as we know them today were formed by the process of "continental drift" out of a single ancient continental nucleus which dates back literally to the beginning of the earth.

The process of fragmentation and drift now seems to be "a very recent thing," Professor Hurley told an M.I.T. seminar this spring. The evidence is impressive for the proposition that there was no splitting of the original continental mass prior to the one which may now still be underway beneath us.

Professor Hurley's study of the accumulated geological data revealed that the most ancient rocks now known are all of about the same age—no matter in which continent they are found—and that they are distributed in recognizable patterns across the world's continents. Carrying these patterns backward through the stages of "continental drift" as they are now understood led to a single coherent pattern for these most ancient rocks. Without exception, says Professor Hurley, these oldest

Artist's impression of submarine rescue operation, showing within the rescue vehicle (left to right) the sphere for rescued crewmen, the access sphere and the control sphere.

The director of the D.S.R.V. work at M.I.T., Brian Cuevas, operating the control system. Circular screens, far left, are sonar displays; the three rectangular screens are for television; the round knob in the foreground is one of a pair with which the pilot controls the craft (one for velocities, the other for angular motions); in the right foreground are the movable telescopes that enable the pilot to see outside the ship optically.

rocks fit into a single pre-continental mass out of which today's continents are presumed to have "drifted." Rubidium-strontium and potassium dating methods establish that these primary rocks are all some 4000 million years old—closely approaching the age of the earth as geologists now understand it.

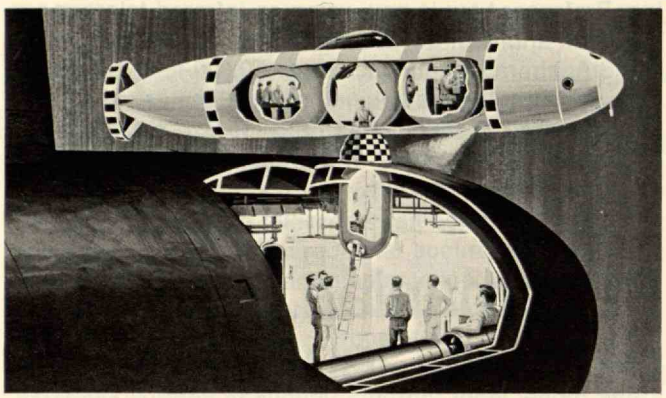
Furthermore, says Professor Hurley, a similar analysis of mineral distribution on today's continents yields a similar coherent pattern—for example, a belt of iron deposits extending along the edge of the primordial continental mass was in a position to become part of the Amazon and Scandinavia where iron is now found; and intrusions of gold in the oldest areas and of copper in newer areas are consistent with their eventual distribution as mineralogists know it today.

"We are beginning," Professor Hurley told the M.I.T. seminar, "to see the synthesis of geology into a global understanding. We feel confident that we are on the track of the full history of the growth and disposition of the earth's crust."

A Submarine Lifeboat

The M.I.T. Instrumentation Laboratory's oldest speciality —inertial guidance systems—recently brought the Laboratory into the news in connection with Apollo. The latest publicized achievement in this line goes beyond the Apollo system in some respects. It is the Integrated Control and Display (I.C.A.D.) system for the Navy's Deep Submergence Rescue Vehicles (D.S.R.V.'s). The main differences are the higher rate of data-handling and the necessity to get by without celestial fixes or supplementary positional information from outside sources.

The objective of the D.S.R.V. is to be able to locate a sunken submarine, mate with the lost craft's escape hatch, and ferry the stranded crew to safety, all within 50 hours of first notification of the emergency. Six D.S.R.V.'s, manufactured by Lockheed Missiles and Space Company, Sunnyvale, Cal., will be deployed in pairs at submarine operating bases around the U.S. coast. Each consists, structurally, of three eight-foot-diameter spheres in a 50-foot shell, the center sphere





having a "skirt" to provide access from a disabled vessel. Operating depth is 5000 feet. With high precision of motion goes a low maximum speed, so the D.S.R.V.'s are transported to the scene by a cargo aircraft followed by submarine or surface "mother" ship.

To mate with a stricken submarine, the D.S.R.V. must be maneuverable with only an inch or two of error. Sensing devices include sonar, television, and an inertial measurement system containing what are described as the smallest inertial components the M.I.T. Instrumentation Laboratory has ever developed for a guidance, navigation, and control system. Whereas an Apollo spacecraft contains a single navigation computer, the D.S.R.V. general-purpose computer is supplemented by a separate digital differential analyzer. It has to take account of effects that have no counterpart in space, such as currents, and—more problematical—the suction and

other hydrodynamic cross-linking effects that appear when a vehicle is moving very close to a stationary object in water. Nevertheless, the system owes much to the Apollo work, and to the Polaris missile experience of some of the project's key personnel.

Position and attitude-control hardware include water jets, a rotatable shroud around the main propeller, and a set of five tanks between which mercury is distributed as a variable ballast. In spite of the large amount of mechanized data-processing, piloting the rescue vehicle is still a task for a human being, and an intensively trained one at that. At present, 16 Navy crewmen are at M.I.T., being trained on an I.C.A.D. model that was built at the Instrumentation Laboratory. It has been fitted with analog and digital computers which simulate the rescue vehicle and its environment.

Size and Quality Together

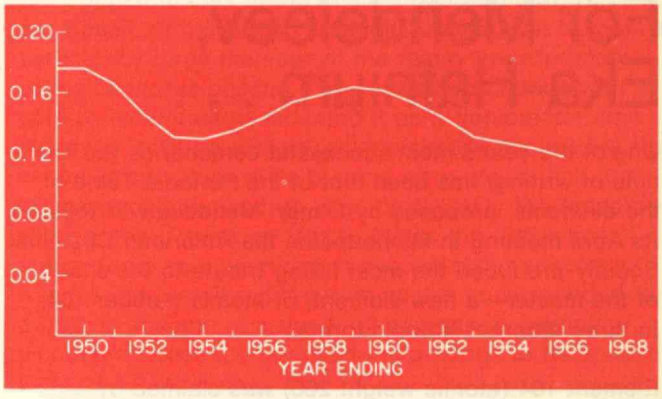
In an era when most observers find engineers in short supply, Frederick E. Terman, Provost Emeritus of Stanford University, has concluded that too many colleges and universities are teaching engineering at both undergraduate and graduate levels. "There are simply not enough students with the requisite ability and the desire to study engineering to go around," he writes in an economic analysis of engineering education for the *Journal of Engineering Education.*

Dr. Terman, who studied at M.I.T. before teaching and becoming Dean of Engineering at Stanford, concludes that there is a minimum size for a cost-efficient engineering school. Small schools—with less than 40 to 50 bachelor's-degree candidates in each department each year—are likely to have higher undergraduate instruction costs per student than larger and far more prestigious schools. Dr. Terman's figures on undergraduate education show that "the combination of an excellent salary, a very light teaching load with half time charged to research, and moderately large class size results in an instruction cost index not greatly different from that associated with a heavy teaching load, no research, and classes that average only 15 students."

And graduate education—not including research support—need not be so much more expensive than undergraduate, writes Dr. Terman, if the institution has enough students to make up classes of 30 to 40 each. Indeed, he writes, "the prestigious large engineering schools with large graduate programs have (overall) instruction cost indices that are frequently lower than the indices for small undistinguished programs that are largely or purely undergraduate."

Are size and quality compatible? Yes, Dr. Terman claims. "Small programs can offer the student only a limited choice of elective courses," and they also have a quality disadvantage because each member of the small faculty must teach "an undesirably wide assortment of topics."

The share of engineering in the total number of bachelors' degrees given in the U.S. is falling; the fraction is remarkably independent of local industrial or educational conditions, implying that the supply of potential engineers is "severely limited," says Frederick E. Terman of Stanford.



While there may not be enough students to fill present engineering programs, another study, by the Engineering Manpower Commission of the Engineers Joint Council, has shown that the U.S. will need a great many more engineers in the future than will be produced under current predictions. The labor market will demand about 58,800 new graduates in engineering each year until 1975. If the number of engineering graduates kept pace with the growth in total college graduates, the supply would be adequate. But from 1960 to 1966 the percentage of degrees in engineering decreased from 14.9 to 11.3 of all degrees awarded to men.

At present, the shortage is filled largely by foreign-born and educated engineers. The number of immigrant engineers entering the U.S. labor force between 1957 and 1966 averaged 4,240. However, in 1967 the number jumped to 8,822—28.6 per cent of the U.S. engineering output for that year.

The statistics are somewhat inaccurate because many of the foreign immigrants also received degrees in the U.S. and are therefore counted twice. But despite this, it is clear that the U.S. will need to produce more engineers and cannot depend indefinitely on foreign manpower to fill U.S. engineering labor markets.

The answer may lie in enticing more American students into engineering by creating more, larger, quality engineering schools of the type advocated by Dr. Terman.

For Mendeleev, Eka-Hafnium . . .

One of the year's most successful centenaries (up to the time of writing) has been that of the Periodic Table of the elements, proposed by Dimitri Mendeleev in 1869. At its April meeting in Minneapolis, the American Chemical Society produced the most fitting tribute to the shade of the master—a new element, of atomic number 104, in three different isotopic forms.

Element 104 (atomic weight 260) was claimed by a group of Russians headed by G. N. Flerov in 1964, and was named kurchatovium. Attempts to duplicate its behavior at Berkeley have not been successful, and the Russian claim has not earned general credence. What was announced at the A.C.S. celebration, by Albert Ghiorso of Berkeley, was a set of isotopes of element 104 with atomic weights 257, 258, and 259. For the present, the element is being called simply eka-hafnium, for reasons of theoretical analogy which are agreed upon by East and West alike, and besides, are soundly Mendeleevian in principle. The Berkeley method was to bombard californium-249 (first made also at Berkeley, in 1953) with carbon-12 nuclei accelerated to 71 MeV. The Russian work of 1964 used, instead, plutonium-242 as the target and neon-22 at 155 MeV as the projectile. The Russian "104" was described as decaying by spontaneous fission with a half-life of 0.3 second. Of the Berkeley eka-hafnium isotopes, those with atomic weights of 257 and 259 decay by alpha-emission, turning into the known element 102 (nobelium), thus confirming that their atomic number is indeed 104. The other isotope, with atomic weight 258, decays by spontaneous fission, with a half-life of only about 0.01 second.

. . . and More to Come

At the same Centennial Symposium, a review of "prospects for further considerable extension of the periodic table" was given by Dr. Glenn T. Seaborg, Chairman of the Atomic Energy Commission, Nobel Prize winner (1951) and co-discover of elements 94 through 102 (1940 through 1958). He drew attention to recent theoretical work that suggested, taken together, that a nucleus with around 114 protons and 184 neutrons should possess not only the quality of stability against spontaneous fission (conferred by the completeness of the "shells" of nuclear particles) but also stability against electron emission.

It would be subject to decay by alpha-emission, but with a half-life of at least a year and possibly (Dr. Seaborg's own estimate) nearly 1000 years. Certain other combinations of protons and neutrons also look favorable, and comprise an "island of stability" in a sea of otherwise incompatible proton and neutron numbers. (This image is taken from a complete landscape described by Dr. Seaborg.)

Now, element 114 is already the subject of a Soviet claim. The A.C.S. meeting learned that Russian physicists have found what they think is a sign of it in ancient stained-glass windows. Because of its probable chemical similarity to lead (this much is agreed, on Mendeleevian grounds) the proposed element, if it occurs in nature, may have been concentrated by metallurgists of former times in the leadwork of church windows. Over the centuries, its decay should have left tracks in the adjacent glass, and these tracks are what the Soviet workers think they have found. Dr. Seaborg considers that this notion does not fit in with the predicted half-life.

Be that as it may, the prospect of being beaten by the Soviets is a powerful stimulus to scientific enquiry. Berkeley seems unlikely to be alone much longer in its exploration of the transuranic regions. A large number of proposals are currently under discussion for university work on heavy element reactions. One of them is already a year old—that a consortium led from M.I.T. should rent from High Voltage Engineering Corporation the highest-voltage Van der Graaff accelerator built to date, a machine that is already undergoing voltage tests.

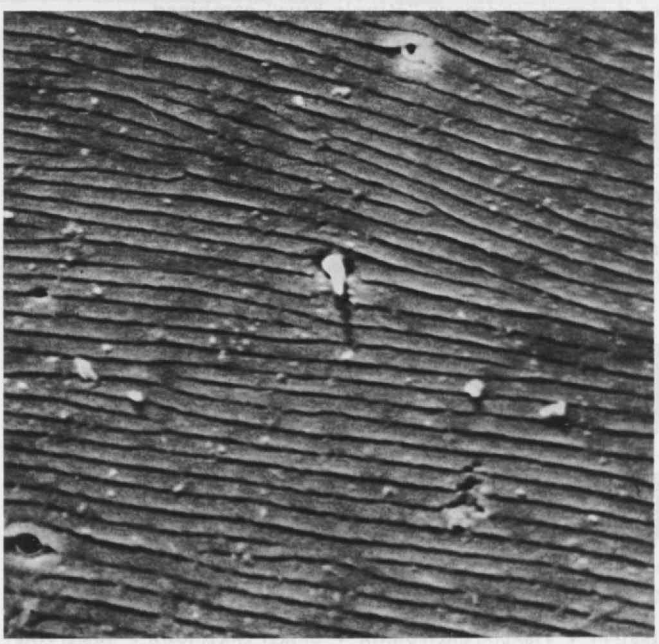
(Right) the diffraction grating (spacing—1.04 microns) of Litolibrus obesus, *at a magnification of 2500, and (far right) of a carabid beetle at magnification 1100.*

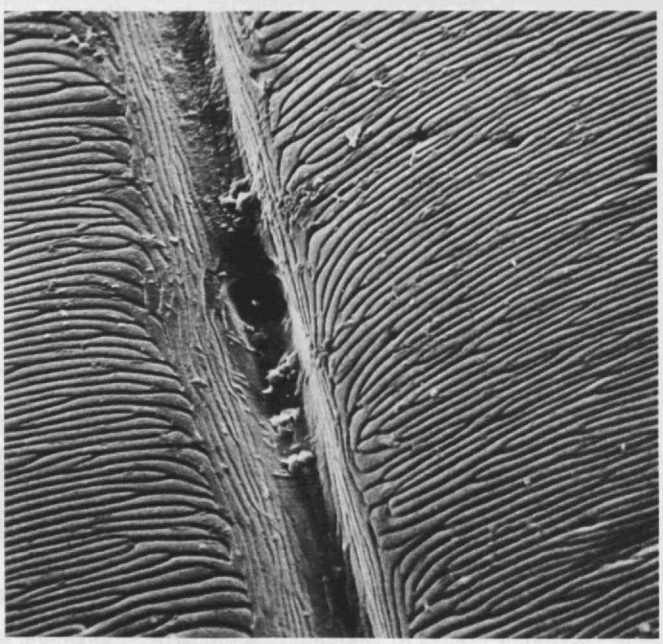
The Diffracting Southern Beetles

Of the nearly 200,000 species of beetles known to entomologists, a mere 600 or so belong to the family Phalacridae. But the Phalacridae have one remarkable distinction. Many of them—particularly the Australian and South American species—color themselves by growing diffraction gratings on their wing-cases. Until this year, only one beetle was generally thought to specialize in diffraction, namely *Serica sericea,* of the scarab family. It now turns out that many other scarabeid beetles bear diffraction gratings, as do a few of another, less famous family, the Carabidae, and the Mutillidae family of wasps. This much is to be found in two *Journal of Insect Physiology* papers by H. E. Hinton and others (Vol. 15, p. 539, and another still in the press as the time of writing). But the family that has really taken diffraction gratings seriously is the Phalacridae, and their achievements are described by Professor Hinton—Fellow of the Royal Society, and Professor of Entomology at Bristol University, England—in *Nature* (March 28, p. 953). The paper, like the others, is co-authored by D. F. Gibbs of the University's Department of Physics.

They began to look at the Phalacridae when Mr. R. T. Thompson, of the British Museum, pointed out to them a particularly large member of the family appropriately called *Litolibrus obesus.* They coated the beetle with a gold-palladium alloy, mounted it on a goniometer, and observed it with a low-power microscope focused at the center of curvature of its bulging wing-cases. The first-order spectra showed up well, particularly the forward-shining one (Professor Hinton thinks the diffraction colors serve as a warning). A second-order spectrum was just visible. The diffraction angles corresponded to a grating spacing of around 1.2 microns. A scanning electron microscope revealed the gratings to be spaced at 1.0 to 1.1 microns.

Hinton and Gibbs went on to examine many other Phalacridae, and list a great number of diffracters. Perhaps surprisingly, every genus that contains diffracting species contains other species that do not diffract. European species do not, while diffraction is very common in South American and Australian members of the family, and not unknown among the Asians and Ethiopians. Anyone looking for further diffracting beetles should beware of appearances—members of families other than the Scarabeidae, Carabidae, and Phalacridae get similar colors by less sophisticated means. The test is to change the angle of incidence.





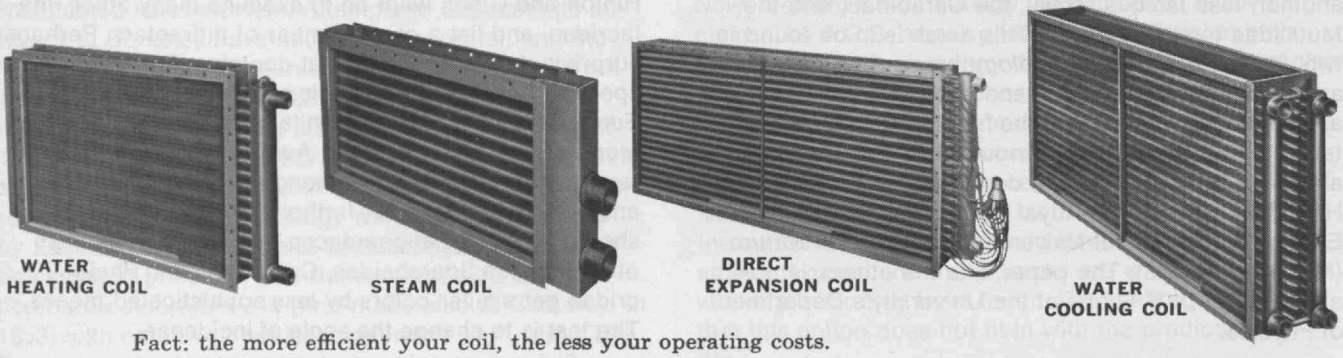


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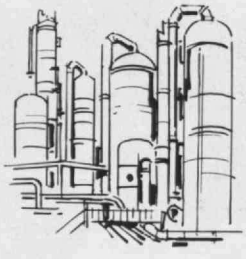
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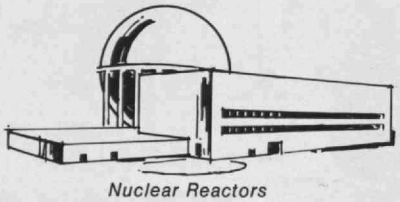
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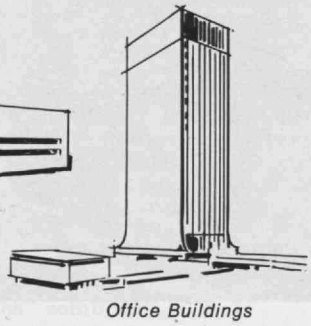
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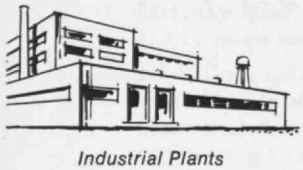
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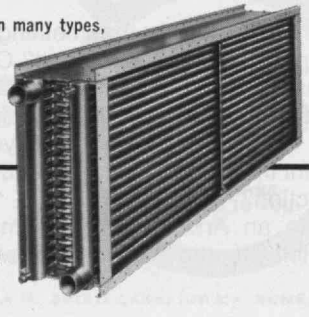

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Colleges and the Cities: A Bitter Send-Off . . .

After more than 20 university presidents and their representatives had spent the better part of two days at M.I.T. reviewing the universities' role in solving the nation's urban problems (*see below*), Daniel P. Moynihan, President Nixon's Assistant for Urban Affairs, sent them home with a harsh judgment.

"The first requirement upon a university seeking to study the phenomena of social change," said Mr. Moynihan, "is to admit the poor state of our present knowledge. Our capacity to describe social phenomena, much less to predict them, is limited indeed," he declared. And the universities, in failing to recognize and admit these limitations, have in effect "promised things they cannot deliver."

"The single most important thing the university must do," Dr. Moynihan told the assembled presidents, is to restore the public's confidence in them as institutions which "can be looked to for honesty and courage." Accusing academic institutions of having "double standards in areas of great importance," Dr. Moynihan warned that "their credibility is eroding."

"We have an atmosphere in the U.S.," he said, "in which truth-telling is dangerous." And the universities, by failing to be honest about themselves and by failing to understand the limitations of their expertise, are in no small part responsible, he said.





After more than a day of private conversations about their institutions' responses to urban problems, some of the 20 university presidents gathered at M.I.T. this spring held a press conference to summarize their discussions; then the entire group heard Daniel P. Moynihan, President Nixon's Assistant for Urban Affairs, warn that the universities' "credibility is eroding" (above, and far left with John W. Gardner, Visiting Germeshausen Professor at M.I.T. who was chairman of the meetings.

At the press conference (left to right) were Presidents Lloyd H. Elliott of George Washington University, Nathan M. Pusey of Harvard University, Martin Meyerson of the State University of New York (Buffalo), Norman Topping of the University of Southern California, and Charles E. Odegaard of the University of Washington, with John W. Gardner (standing), and M.I.T.'s President Howard W. Johnson.

For example, said Dr. Moynihan, America's universities are now in the process of discovering the nation's ethnic complexity. But at the same time they continue to treat society as if it were composed of only two kinds of people—black and white. Or, he told the Presidents, consider another example: it is "absolutely staggering" that city blocks destroyed in riots one, two, and even four years ago remain uninhabitable ruins today, even though many are approved for renewal or included in Model Cities. The reason, said Dr. Moynihan, is the great ability to obstruct change which has been built into acts of the federal government; and analysis of this, he says, suggests that the universities—by providing expert counsel and research to many federal agencies—"have had a large part in establishing the conditions under which change could take place."

. . . and Work in Progress

After a two-day closed meeting of presidents and other representatives of 20 leading American universities at M.I.T. early this spring, John W. Gardner, Chairman of the Urban Coalition and Visiting Germeshausen Professor at M.I.T., told newsmen that the nation's academic community is helping on urban problems "in fairly impressive ways." He especially emphasized "the scope and variety of the field work" which was reported by the assembled college presidents.

Indeed, said Nathan M. Pusey, President of Harvard, you cannot have the "full sense of excitement and promise" about college and university urban

studies without knowing what the students are doing. Yet, agreed several presidents, such field ventures are not enough; they must be based on a foundation of intellectual understanding achieved in the classroom.

There are other problems, too. When a reporter asked about funds to support this work, President Pusey replied that "she speaks like a college president." In fact, said Howard W. Johnson, President of M.I.T., extending President Pusey's observation, the presidents' discussions revealed how many institutions are moving ahead in the urban studies field without a solid financial base. The universities "are operating on 'soft' money. But you cannot build for the long term without 'hard' money," said President Johnson, "and this is one of the problems before the nation."

President Pusey raised another aspect of the funding problem when he noted that within a few years there will be "literally thousands" of people coming out of the universities "on fire to work in the cities." The problem then will be to find ways to channel their enthusiasm and support the work which they will be able to do.

Without support, said Lloyd H. Elliott, President of George Washington University, there will be a new community of "frustrated, heartbroken people" anxious to do a job for which there are no resources.

Dr. Gardner emphasized the variety of university approaches to urban studies and problem-solving, and he cited as an example the catalog of the Harvard University urban activites listed in the report of the Harvard Committee on the University and the City (*see* Technology Review *for April, page 92*). And, though all academic activities in this field must be in response to expressed needs, he said, the increase in communications channels between university and city means that we will not lack for ways to apply our skills.

Dr. Gardner suggested by his press conference remarks that the presidents' meeting was not designed to study new programs or develop new organizations. But the agenda obviously included discussion of mechanisms by which universities might better develop and share their experience and expertise. A joint effort such as that which Brookhaven National Laboratory represents for the physical sciences was one suggestion.

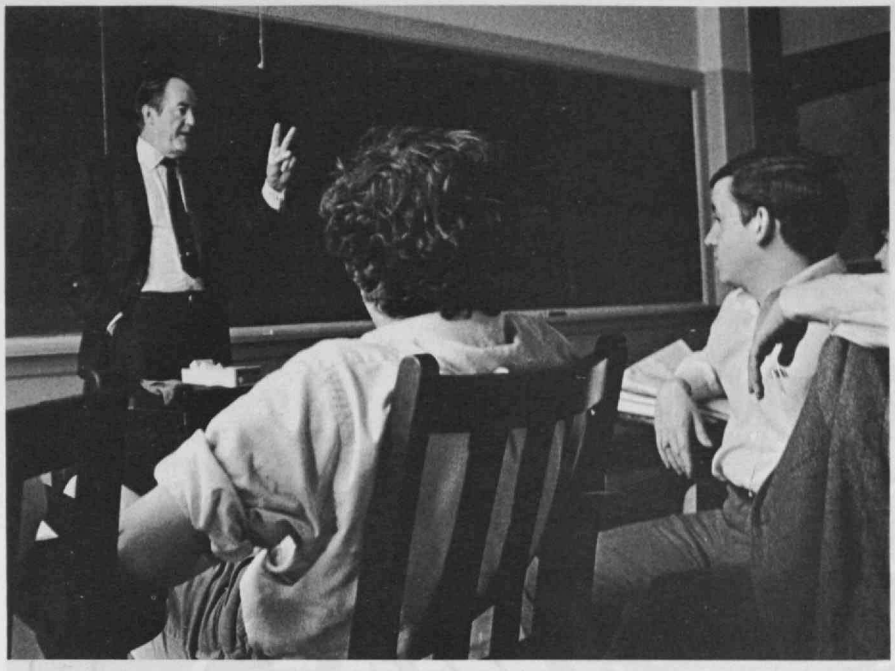
Hello, Professor Humphrey!

Former Vice President Hubert H. Humphrey, who has become Professor Humphrey since he accepted a dual appointment at Macalester College and the University of Minnesota last winter, devoted two very full days this spring to M.I.T. students when he visited the campus as Karl Taylor Compton lecturer.

Professor Humphrey was delighted to communicate with everyone—whether by shaking hands or by sitting down to debate. He held classes, lectured, attended luncheons, and spoke to informal meetings of small groups of students.

And the students? A year ago Cambridge was the most enthusiastic Eugene McCarthy stronghold east of Minnesota, and there are still a few students here who won't let anyone, including Professor Humphrey, forget it. But these were definitely the exceptions; M.I.T. responded with enthusiasm, curiosity, and a large amount of genuine eagerness to talk with and listen to the man who came within a few votes of the Presidency of the United States.

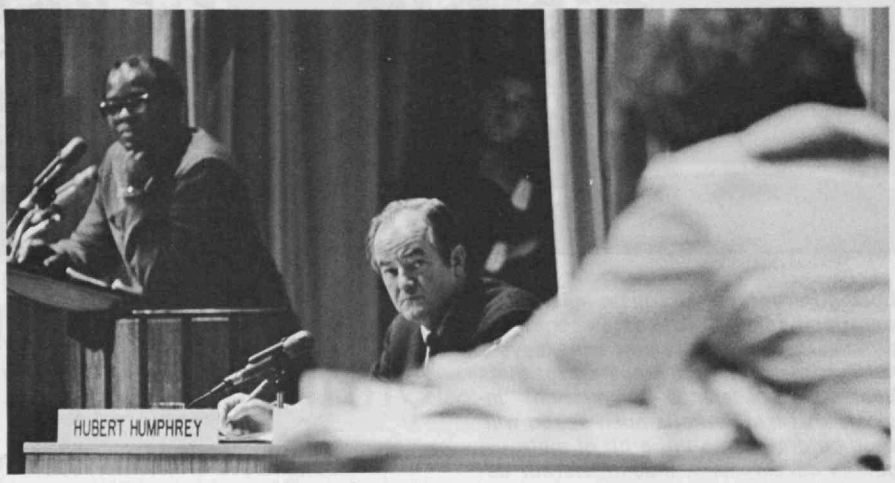
To be sure, there were a few doses of heated questions—especially during the first evening's panel, "Youth and Politics." Professor Humphrey was asked about Vietnam, about the record of the Johnson Administration, about the uses of violence, and about the tactics of student protest.



Hubert H. Humphrey, the former Vice President turned college professor, had two busy days at M.I.T. this spring as Karl Taylor Compton Lecturer. The political science classes to which he spoke (left) were closed to the press specifically at his request, but there were informal sessions when the former Vice President appeared with his friend Jerome B. Wiesner, M.I.T. Provost (below, left), and two formal appearances in Kresge Auditorium.

There—speaking on "Youth and Politics" with Boston City Councilor Thomas Atkins as moderator—Mr. Humphrey "disarmed and bewildered the largely critical crowd with his candor," said the Boston Globe. *His prescription for campus turmoil: "A minimum of civil authority and television, combined with a maximum of patience, time and internal communication." (Photos: Owen D. Franken)*

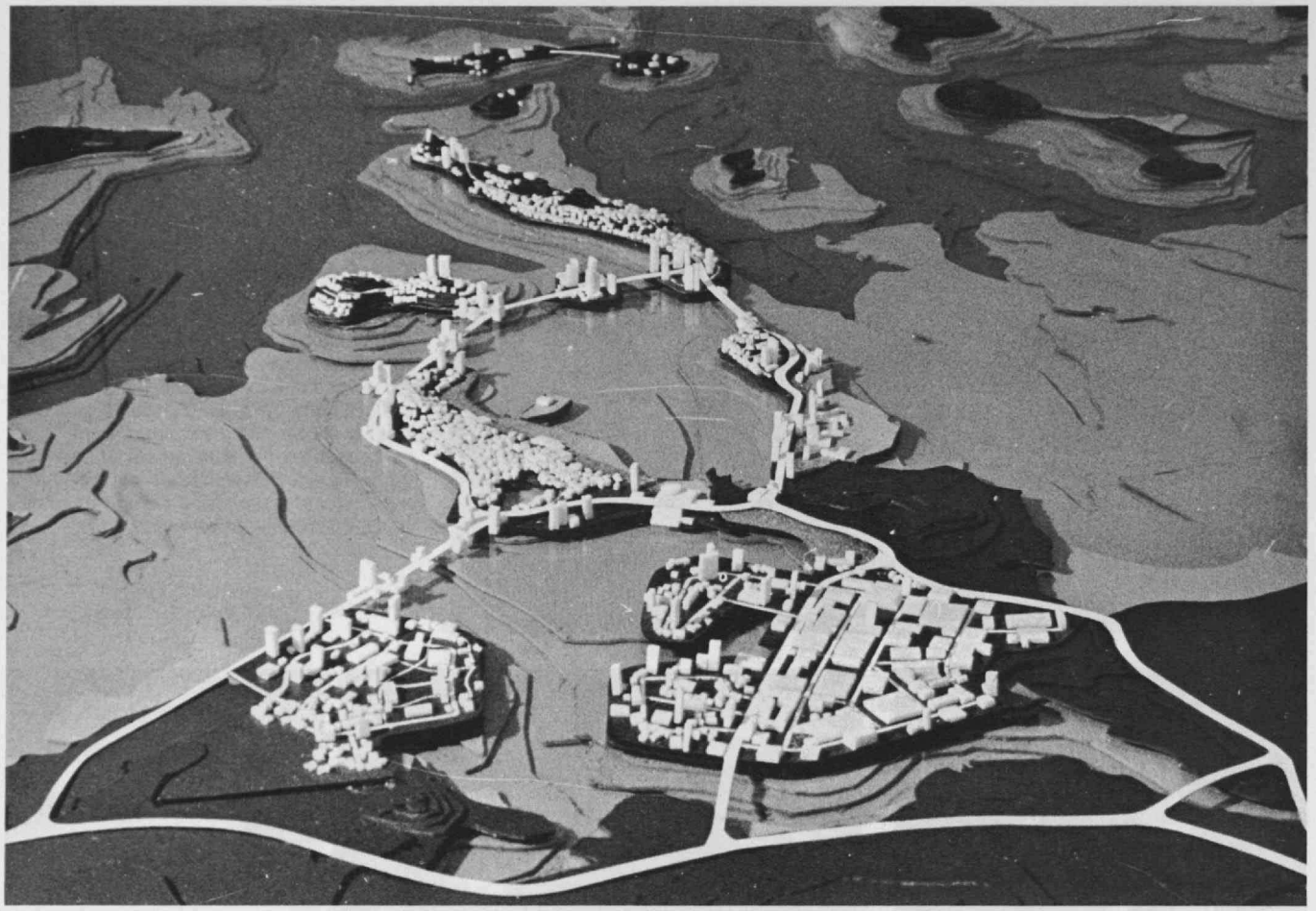




But the second evening provided Professor Humphrey with an ample audience (and ample quiet) to pound the podium in favor of an inter-university consortium for urban policy research, an Urban Development Bank, and a National Urban Homesteaders Act to subsidize the risks of low-cost housing. "The most dangerous missile facing this country is not that of the enemy, but the one of poverty, hunger, slums, deprivation, bitterness, and hatred that grips the people of this nation," he said.

His clearest echo came that night from another former mayor, John F. Collins, Visiting Professor of Urban Affairs at M.I.T. and former Mayor of Boston. Both sat on the Kresge panel, and both engaged in a dialogue about how to get things done; it was about federal agencies, state legislatures, machinery, and money. Professor Humphrey's call for action was answered by Professor Collins' call for legislation which would give one per cent of all federal urban appropriations to research. "We simply don't know the answers to a lot of these problems," he said.

Professor Humphrey spoke repeatedly and passionately of the need to reorder national priorities to meet our pressing domestic problems. He spoke in favor of restructuring the federal-city-state relationship. He also called for changing the machinery by which problems can be studied—by calling on the universities to get together. Did he communicate his message? The verdict of the radical minority is already known; they told him what it was. But one wonders about the response of the other students—the vast majority—who many have said less, but heard more.



Boston Harbor has 47 square miles of water and some 30 islands. Recent proposals for dramatic new uses, says an M.I.T. research report prepared for the Boston Harbor Islands Commission, "indicate that the Harbor's open space will soon be drawn into the orbit of metropolitan development. Indeed, Harbor development may offer the best chance of arresting the decline of the urban core," says the report.

To show what is meant, the M.I.T. research group made this study model of a 20-year development proposal for a major new community on the 500 acres of land in the chain formed by Thompson, Spectacle, Moon Head, and Long Islands.

Getting the Harbor off the Ground

"Unless the people of Greater Boston become actively interested in the future of their harbor, their own communities may suffer," warns Stanley M. Jacks, Senior Lecturer in Management at M.I.T., who has just completed a major, six-month study of the potential of the 47-square mile, historic harbor and its islands.

Professor Jacks and his group presented the result, titled "The Harbor Islands," in April to the study's sponsors, the Massachusetts Harbor Islands Commission (*see* Technology Review *for October/November, 1968, p. 80*). The Commission, says Professor Jacks, must now find broad public and political support for further investigation (and development) of the valuable coastline resource.

Meanwhile, both the local and national press have been giving considerable attention to Boston's competition with Philadelphia and, possibly Washington, D.C., to be named as host to the 1976 Bicentennial Fair, Expo '76. Boston has proposed the harbor islands as its fair site. Like other current proposals for the harbor, the Expo '76 site would eventually become a "new community" which could aid two major Boston problems: metropolitan finance and a shortage of urban land for new housing.

The Jacks report, surveying the full range of possible uses, finds three main areas where present ignorance could cause serious planning and development hazards:

First, the geology of the harbor may make land fill and large-scale construction impractical. "Very little is known of the geology of Boston Harbor,"

says the report. Moreover, the floor of the harbor is irregular in composition; the subsoils thought to be most common "do not generally produce favorable foundation conditions."

A second unknown factor is the extent of water pollution and the manner in which water currents are now carrying wastes. The present pollution problem could be seriously complicated by land fill, and even today there exists no figure for the volume of pollutants now entering the harbor. A preliminary, one-year study of the water flow, estimated to cost up to $200,000, is needed.

Finally, the report cites the future predicted tripling of air traffic at Logan Airport as a development hazard. The airport now handles 500 flights per day; but, by 1975—one year before the proposed Expo—this figure may reach 1,500. Since Logan Airport occupies a central place in the harbor, the resulting increase in the noise of landing planes is a serious threat to the proposed communities, it says.

A final warning is issued by Professor Jacks: the harbor and its 30-odd islands are now controlled by six different municipalities, which may be reluctant to yield control to a broadly powered state development agency. "The challenge to both us and the commission is to make people and legislators realize how much the development of the harbor can help them." But, he added, "we will need to know a lot more before we will know what will help the area most."

Jobs Should Be Local

When Secretary of Labor George P. Schultz early this spring proposed overhauling the nation's manpower programs to decentralize federal services and improve their delivery to localities, he was following the general aims of the Nixon Administration and the recommendations of the National Manpower Policy Task Force, an independent group of manpower experts headed by Charles A. Myers, Professor of Management and of Industrial Relations at M.I.T.

The Task Force recommendations (compiled before the Presidential elections last November and published in January as "The Nation's Manpower Programs") centered on the importance of improving services to local communities.

"The first lesson," said the Task Force, "is that available manpower services should be provided on the basis of need and not impeded by diverse eligibility requirements, varying administrative practices, or competing agencies." A coordinated plan based on this principle, said the group, should replace present "piecemeal" operations in many different federal offices.

Secretary Schultz began his program by proposing to consolidate several different programs—New Careers, Manpower Development and Training, Youth Corps, Operation Mainstream, and the Work Incentive Program and others—under one administration. He proposes to provide a single sum to state and local governments to be apportioned according to need. Secretary Schultz also proposed eliminating several administrative "layers" below the Manpower Administrator to improve communications with local areas. And President Nixon's internal reorganization of the Manpower Administration in March was looked on as a necessary first step towards these goals.

The National Manpower Policy Task Force is an independent group of 18 experts, most from university campuses, which was formed in 1964 on the recommendation of a National Academy of Sciences committee under James R. Killian, Jr., Chairman of the M.I.T. Corporation. Secretary Schultz, who studied and taught at M.I.T. from 1947 to 1955, was himself a member of the Task Force before he became Secretary of Labor this winter.





"We must pay particular attention to the effects of poor waste management on the quality of our urban environment. . . . Clearly, if solid wastes are not properly treated and disposed of, they may undermine all of our other efforts to improve environmental quality."—John F. Collins, M.I.T. Visiting Professor of Urban Affairs, to the U.S. Senate Subcommittee on Air and Water Pollution, Boston, April 10, 1969. (Photos: Benjamin Lifson)

Nationalizing the Trash Can

John F. Collins, Visiting Professor of Urban Affairs at M.I.T. and former Mayor of Boston, told a subcommittee of the U.S. Senate Committee on Public Works this spring that the federal government has two ways it can deal with solid waste disposal: it can attack wastes either while they are generating or while they are degenerating.

"We can focus our attack on the generation of wastes; that is, we can attack the problem at its source; or we can focus on the collection and disposal aspects of the problem," he testified. But his speech demonstrated the fundamental fact about solid waste disposal: everything which goes into a city must, one way or another, come out of it again. "We can move wastes all around our environment, manipulate them, decrease their volume, and change their state, but we cannot ultimately destroy most waste residues."

Professor Collins focused his remarks to the Subcommittee on Air and Water Pollution on the need for re-examination of economic incentives as a means of discouraging producers and consumers from using ever-more indestructible, non-reusable, throw-away matter. "Our present system of industrial incentives hinders rather than promotes our attempts to attack the generation of solid wastes . . . Industry is basically in an adversary position *vis-a-vis* the solid waste problem.

"One thing is clear, however; at the present time, most producers have no economic incentive to consider problems of disposal in designing their products and packages. The development of such incentive is a prerequisite to any comprehensive attack on the waste generation problem."

Professor Collins added that present consumer incentive plans could not be applied very effectively to prevent the approaching crisis. "It is evident," he concluded, "that we must begin to restructure our private and industrial incentive system," and he said that the resulting thorough economic analysis should be a "major part" of any attack on the problems of waste generation and waste collection.

Western Schools and Non-Western Students

"The notion that the West has developed all the ideas and technology and that emerging nations need only adopt it is grossly wrong," said Everett E. Hagen, Professor of Economics and Political Science, at a panel given by the M.I.T. International Students' Council. He and other panelists agreed that U.S. educational institutions can only serve students from developing Asian, African, and Latin American countries by making a more serious effort to understand their real needs.

Professor Hagen criticized two assumptions which are often taught to foreign students while they study in the U.S. The first is that it is beneficial to emerging countries for large corporations to build plants within the countries' boundaries. "Very often," he said, "these plants are self-contained and operate independently of the local economy."

The second assumption is that economics and political science teaching in the U.S. can be applied to a country like India. "In fact," he said, "our whole system is based on a labor-saving economy and the assumption that there are hardly enough workers to go around. This is inappropriate when applied to a country with a vast potential labor force."

A third assumption which schools would do well to correct was explained by

V. Lakshmi Narayanan, Director of the Birla Institute of Technology at Pilani, India, who is a guest of M.I.T. this year at the Center for Advanced Engineering Study. This was the idea that "less developed" nations should be "raised" to the level of development "equal" to the West. "The world is unequal and the gap between the West and other nations is not just a difference of 'level'," he said. "The nations of Asia, Africa, and Latin America should aim for *adaptation* and not *adoption*."

The discussion focused on the problems of the foreign student who comes to the U.S. for his training. Professor Narayanan suggested that foreign students at M.I.T. study their own countries while they are in the United States. "Before you go back," he warned, "apply your knowledge of your own country to a study project. Otherwise, when you get home, what had seemed possible in America may suddenly look completely impossible, and you will be frustrated and take the next plane back to the United States." "What the student faces is the pain of his culture being smashed," said another panelist, David G. Wilson, Associate Professor of Mechanical Engineering, who worked for two years in Nigeria. He asked the students in the audience to tell how they thought they would be welcomed when they returned home, having been changed through living in another culture.

To summarize the conclusions of the afternoon, panelist Louis D. Smullin, Head of the Department of Electrical Engineering, called for educational institutions to re-examine what they could do. "I've found that global discussions of this problem tend to be just that," he said. "It's time to get down to specifics. Sometimes, if you begin to do things on a local scale, things begin to happen."

Computer on Subsidies

"We have been playing tunes on the computer with half a dozen new elements." This doesn't sound like part of a legislative hearing, but it is. It is the testimony of David G. Wilson, Associate Professor of Mechanical Engineering at M.I.T., on the subject of the Boston commuter rail system's financial crisis.

Politics and computer science have been tuning in with one another for the last several months while Professor Wilson has served part time as staff consultant to Massachusetts State Senator James R. McIntyre of Quincy. Senator McIntyre is a prominent member of the Senate commission probing the Metropolitan Boston Transit Authority's financial situation.

Since many state legislators believe that the state—which has paid most of the $3.5-million rail deficit in past years—will cease paying it this year, Professor Wilson has been calculating a system of assessment by which the 79 greater Boston cities and towns who use the rails could shoulder the payment instead.

Professor Wilson's goal—obviously hard for either academician or computer—is a single formula which divides the deficit fairly among all the towns and which stands a remote chance of passing the state legislature. The formula includes such factors as population, distance, and rail use, of course. But Professor Wilson has also been throwing his expertise behind Senator McIntyre's proposal for an "incentive rebate," which would lower the assessment on a town which agrees to build a new rail station or to maintain an existing one. At present, suburban towns resist rail stations because of the additional traffic and police problems they bring.

On the other hand, argues Professor Wilson, if his formula offers a rebate of $25 per town inhabitant who uses the rail service on a town's assessment, the town can benefit financially from having the station—while it will have contracted to maintain the station itself. In the long run, town governments may then favor an expanded rail network, he thinks.

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Special Report



Flanked by 12 of his panel colleagues, William F. Pounds, chairman of M.I.T.'s review panel on its special laboratories, described for the press on June 2 the panel's recommendations that these large defense-oriented research groups make "energetic" efforts to diversify their work so that it will cover a full spectrum of "the exciting and important problems of our society." Given success in this effort, the panel agreed, the laboratories should retain their M.I.T. affiliations and continue to perform classified research—though classification and clearance barriers should ultimately be reduced. The New York Times (see next page) *called the panel report "a significant contribution to sanity and social responsibility."*

Defense Research Confirmed, But With a New Dimension

M.I.T. will continue to operate its two "special laboratories"—Instrumentation and Lincoln Laboratories—and to do classified defense research within them, while "energetically" exploring new means "to provide a more balanced research program."

The vision of adding new leverage on social problems by developing a more balanced research portfolio in these two large research organizations was advanced early this month by a special review panel chaired by William F. Pounds, Dean of the M.I.T. Sloan School of Management, reviewing the Institute's commitments to defense and space research.

Upon receiving the panel's report, Howard W. Johnson, President of M.I.T., told the Faculty Council that the Institute, on the basis of the panel's recommendation and using the guidelines of its report, would "resume accepting new programs of classified research in the laboratories." And, said President Johnson, "implementation of the longer-term proposals . . . will (have) my full support."

"The country's scientific and technological base rests in large part on the universities, and this base should be available to support advances in defense-related fields," the panel said in its first report. But it added that "M.I.T.'s non-academic public service (those services to society that go beyond teaching and scholarly research) should be diversified by including a considerably larger non-military component devoted to the major problems of society."

Sense on Defense Science

The following editorial is reproduced in full from The New York Times *for June 4, 1969:*

An important part of the current revolt on American campuses is directed against the dependence of universities on research contracts from the armed forces. Many students and professors complain that science is being chained to a military chariot when the most urgent tasks for scientists lie in making the cities more livable and enhancing the quality of life.

No center of learning has had to face more searching inner questioning on this issue than the Massachusetts Institute of Technology, which operates two special laboratories heavily involved in secret projects for the Defense Department and the space program.

The report on these laboratories just issued by a panel representing all viewpoints from M.I.T. trustees to "New Left" undergraduates is a significant contribution to sanity and social responsibility, not merely for M.I.T. but for all scientists, on questions that have caused deep concern to the entire academic community since the dropping of the first atomic bomb on Hiroshima a quarter-century ago.

The report is admirable as evidence that confrontation tactics have not yet entirely elbowed rationality out of formation of university policy. It is equally admirable as reassurance that the restructuring of universities to allow a more effective voice for students and faculty can bring beneficial results for the institution, when all elements proceed with a genuine desire to arrive at consensus instead of polarization.

Specifically, the panel calls for a gradual shift in priorities at the two special laboratories to provide a better balance between military and civilian projects. But even the most radical members of the panel acknowledge that it would be self-defeating for M.I.T. to sever its ties to the laboratories or to ban all classified defense work on campuses.

The sole effect of such a spinoff, in the absence of a basic redirection of government research activities, would be to force the armed services to set up more laboratory complexes of their own or to give huge new contracts to aerospace and other corporations. The result would be precisely opposite to the one desired by the student and faculty dissenters—a strengthening of the military-industrial complex and a diminution in the capacity of university scientists to exert any useful influence in the shaping of public policy on military matters.

Indeed, wrote members of the panel in their first report which was released in Cambridge on June 2, "M.I.T. should evolve diverse institutional mechanisms so that its future response to the needs of society can be flexible, original, and significant."

The special review panel was named by Howard W. Johnson, President of M.I.T., late in April "to evaluate the implications of the laboratories for the Institute in its prime responsibility for education and research and in its responsibility for service to the nation" (*see* Technology Review *for May, pages 80A to 80D*). Upon receiving the report, President Johnson told the Faculty Council that it is "a reasoned and responsible report that will be immediately useful in establishing some guidelines for our future direction." New programs of classified research will be accepted in the laboratories, effective at once, he said—thus ending a "moratorium" on new programs which was in effect during the period of the panel's initial deliberations.

Correcting an Imbalance

Instrumentation Laboratory is a world leader in the design and development of guidance, navigation, and control systems for advanced vehicles—including the Apollo spacecraft and Thor and Polaris missiles. Lincoln Laboratory is an advanced electronics and communications laboratory working in the fields of radar, computation, radio astronomy, communications, and solid-state technology.

Both laboratories, said the panel, have served the nation with distinction and at the same time have provided M.I.T. with "a major source of opportunities to interact with practical problems," producing "exciting opportunities" for a limited number of students and faculty. But the scope of the laboratories' research problems, said the panel, "is narrow compared to the diversity of campus interests" and is largely military in orientation and sponsorship. The result is "a serious problem of imbalance," said the panel, which—if continued in the long term—"would not fulfill M.I.T.'s ultimate objective. Rapid changes cannot be expected, but we feel a real sense of urgency is required in the redeployment of our energies," said the report.

To set these events in motion, the panel agreed on four recommendations:
1. Though the laboratories are clearly committed to important current problems, they and M.I.T. should "energetically explore new projects to provide a more balanced research program."
2. The laboratories and M.I.T.'s academic departments should join to explore how "the educational interaction between them" can be expanded.
3. Though classified work may have to be continued at the laboratories in support of their public service mission, there should be "intensive efforts to reduce classification and clearance barriers."
4. There should be a standing committee of students, faculty, and laboratory staff to review and advise the President of M.I.T. on laboratory programs and new projects.

New Academic Responsibilities

The panel's report said, "In the long term we expect that there will be an increasing public awareness of the powerful contributions that universities can make to the solution of pressing social problems which face the country, and we hope that the necessary funds will be provided by government agencies. The nation's universities should consider it their responsibility to help bring this about. . . .

"We find today a heavy emphasis on defense-related research and development in the country at large, an emphasis which detracts from similar efforts aimed at other urgent needs of society. Although the emphasis on defense work came about as a response to perceived national needs, it has hampered the nation's ability to cope with the problems of the contemporary world. As far as M.I.T. is concerned, the nation's emphasis on defense produces a bias towards specific areas of research at the Institute, and makes it more difficult to move in other directions. M.I.T. has a role to play in attempting to redress this balance, not only within itself but also at the national level. . . .

Following the formal press conference at which the review panel reported its recommendation to continue—with more balanced missions—M.I.T.'s defense research laboratories, Jerome B. Wiesner, Provost of M.I.T. (left), told reporters that the panel recommendations "will help us to do some of the things we've been trying to do." Indeed, he said, the panel report may add major force at the national as well as the local level to the effort to fund socially-oriented research on campuses heretofore heavily committed to defense-oriented studies.



"In a world in which applications of technology have increasing importance, it seems clear that M.I.T. will want a variety of opportunities to interact with practical problems, sometimes involving large-scale projects, in its education, research and public service roles. The existing special laboratories have provided a major source of such opportunities, primarily in research and development areas supported by the Department of Defense and N.A.S.A.

"While this has presented exciting opportunities for a limited number of students and faculty, the scope of the available programs is narrow compared to the diversity of campus interests. For responding to future challenges, M.I.T. should have the same flexibility which it illustrated in the past by starting the special laboratories. Equivalent challenges may arise in such fields as biomedical engineering, transportation, and many others. New opportunities will be needed to make possible more broadly based participation, particularly in non-defense areas. . . ."

Reopening the Question

Availability of future support for socially-oriented research from sponsors —and from M.I.T. in developing interest by government and industry—said Dean Pounds at the panel's press conference, will determine "whether we can achieve these objectives and maintain the present relationship between M.I.T. and its special laboratories. If these goals cannot be achieved," he said, "then the panel would consider it necessary to reconsider the relationship of the special laboratories to the Institute in order to achieve the flexibility we believe is necessary."

The panel, which included faculty, students, alumni, and members of the Corporation, made a unanimous report. President Johnson told them he was "delighted that such a broad-based panel of the M.I.T. community, faced with such complex questions, should have reached a consensus in its recommendations."

But several panel members appended statements to the report, and it was made clear during the press conference that while the panelists may all have reached identical conclusions on an appropriate course of present action, they did not do so by the same route. Indeed, several panel members apparently differed widely in their definition of the fundamental questions underlying the discussion *(see next page).*

The Many Dimensions of Academic Function

When it came to describing what is and is not an appropriate subject for research in a laboratory associated with an academic institution, the M.I.T. panel on its special laboratories (*see above*) ran into its thorniest thicket. For what seems appropriate in one set of circumstances will seem in others—and to others—totally unacceptable.

Noam A. Chomsky, Ferrari P. Ward Professor of Modern Languages and Linguistics, wrote in his personal addendum to the panel report that those who develop new scientific and engineering knowledge, though they cannot ultimately control its social use, "cannot remain blind to the question of how their contributions are likely to be put to use under given social conditions. . . . We do not enjoy the luxury of refusing to take a stand on the essentially political question of how science and technology will be put to use, and we have a responsibility to take our stand with consideration and care," he wrote. Acceptance of war-related research "implies support for particular judgments on military and strategic policy," Professor Chomsky said.

But how can such issues be resolved in consonance with traditional views of academic function? Gregory Smith, an alumnus and Corporation member of the panel, wrote a special statement emphasizing the complexity of the guidelines. All these things, he said, must enter into the decision: "the role of a university, the level of national security in the military field . . . and internally as the result of our disparate internal needs, the level of public opinion, the high need to maintain academic freedom, the high value of respecting the newly developed responsibilities of students, the changing level of international tensions. All of these trace the pattern of complexity," he wrote.

As the discussion proceeded, Dean Pounds said, "we became less and less optimistic about setting up guidelines for all time—but more and more optimistic about the ability of a review group to make sensitive and sensible judgments on issues as they arise."

Can It Be Done?

Two members of the panel on M.I.T. special laboratories (*see above*), supporting all the conclusions about the urgency of research on social—in contrast to military—problems, nevertheless urged that M.I.T. "divest itself of all or part of the special laboratories during the next few years." Their argument was simply that there is so much inertia in large research laboratories that "conversion" is impossible. They hope—but simply doubt—that the panel's purposes, which are also theirs, can in fact be fulfilled.

Edwin R. Gilliland, Lewis Professor of Chemical Engineering, and Marvin A. Sirbu, Jr., a graduate student in electrical engineering, wrote their argument as a question: "How do you set up an organization to solve a particular task in such a way that it does not remain behind after the problem has been solved?"

The Instrumentation and Lincoln Laboratories are simply too large and too entrenched in their special fields, they said. Professor Gilliland and Mr. Sirbu suggested smaller groups of specifically limited duration, performing their assignments with fewer long-range commitments and providing greater student-faculty participation.

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Correspondence Review

"The Last Great Famine"

To the Editor:
It is hard for me to belive that "we have witnessed the last great famine on earth" *(see* Technology Review *for March, pp. 18-25)* when man insists on multiplying himself at 3 per cent a year.

There are many earthly "absolutes" to consider, but let us look at one: the carbon available for man's body structure. The earth's "crust" is .03 per cent C, and if the crust is .05 per cent of the earth's mass (perhaps 2 miles deep) and the earth weighs about 6×10^{24} kg, then we have $.0005 \times .0003 \times 6 \times 10^{24}$ or 9×10^{17} kg. C.

Assuming 1.5 kg. C/person and 4×10^9 people, then we can "permit" $9 \times 10^{17} / 1.5 \times 4 \times 10^9$ or 1.5×10^8 times as many. At a growth rate of 3 per cent a year, it will take n years to have all the carbon in people, or

$$1.03^n = 1.5 \times 10^P$$

$$n = \log 1.5 \times 10^P / \log 1.03 = 8.1761/.0128 = 640$$

Thus in 640 years or 2610 A.D. we shall have all the earth's carbon in people.

R. W. Newman
New York City

The author is consultant on economic design models to General Electric Company.—Ed.

Professor Sylvan H. Wittwer replies:
The letter by Mr. Newman is not only a misstatement of facts but ignores the prime message of our paper—that current increases in food production are greater than the so-called population explosion.

I pose neither as a demographer nor as a geologist. The facts are, however, that (1) world population is now increasing at *two,* not *three,* per cent/year (World Population Data Sheet—1968, Information Service, Population Reference Bureau), and (2) the carbon reserves (absolute) on this earth are as follows (See Rabinovitch, *Photosynthesis,* Vol. 1):

Troposphere (11 km. height of air)	5.5×10^{14} kg
Hydrosphere (oceans)	4.5×10^{16} kg
Lithosphere (the earth's crust—16 km. deep)	7.3×10^{19} kg
Living organism	2.8×10^{14} kg

which far exceed the absolute of 9×10^{17} submitted by Mr. Newman.

The crucial consideration, however, is that during the last few years there has been a slowing down and partial reversal of the so-called population explosion.

This nation's birth rate ran above 24 per thousand in the first 15 years after World War II. It has declined steadily since then and is now about 17.9/1000, the lowest in our nation's history. Expectations are that the rate will continue to drop. Donald J. Bogue ("The end of the Population Explosion," *The Public Interest,* Vol. 7, Spring, 1967) indicates that this trend will probably bring a leveling off of the population of the U.S. and—more important—a leveling off of world population numbers by the end of this century.

This projected reduction in birth rate, coupled with the most remarkable food production records in the history of mankind enumerated in our paper, should buy precious time in warding off, in the future, any great famines on this earth.

Human history records many instances of famine. But recent history includes far fewer such instances. The people of this world have been better fed during the past 15 years than ever before. The real point is that our *concern* with the problem is greater than ever before.

To the Editor:
The absurd statement on the cover of the March issue—"We have witnessed the last great famine on this earth"—is neither a valid conclusion from the evidence in Professor Wittwer's article nor in keeping with the *Review*'s hitherto reliable perspective on food/population/environment problems. Although most authorities would probably agree that Dr. Wittwer is badly over-optimistic in his hope that impressive U.S. agricultural accomplishments will soon be paralleled world-wide, it is to his credit that the only statements in his article with resemble that on your cover are qualified with words like "may" and "one could surmise." It is difficult to imagine, then, what inspired you to ape the antics of many daily newspapers in attempting to out-promise even the most incautious technological optimists. Such giddy and irresponsible statements cannot fail to disappoint those who have come to expect a modicum of judgment from the M.I.T. magazine. Moreover, they have the effect, when widely quoted and disseminated, of convincing the public that panaceas exist where, in fact, there is only potential.

Professor Wittwer himself mentions (although all too briefly) a few of the "ifs" on which such potential hinges: the development of plant-pathogen resistance in the new wheat strains, fulfillment of fertilizer requirements in countries such as India (where, incidentally, fertilizer production is less than half of announced goals for this time under the present Five-Year Plan), and the tapering off of the population explosion.

In an earlier article in *Technology Review* (June, 1968), M.I.T.'s Professor Samuel A Goldblith treats the difficulties associated with increasing food production rather more thoroughly than his cornucopian colleague. He acknowledges the magnitude of the *present* world food crisis, points out that the world is "biologically committed" to an additional billion people within 15 years, and identifies the key problem of educating farmers in underdeveloped countries in the use of known agricultural technology. (The fact that most of the impressive statistics cited by Dr. Wittwer were achieved in the U.S., where literacy is virtually 100 per cent, has curiously not deterred that author from concluding that advances will be even faster in underdeveloped countries where farmer literacy is low.) Professor Goldblith also emphasizes that the realization of world agricultural potential will require capital and technical involvement in this area on an absolutely

unprecedented and hitherto unimagined scale. I scarcely need add that the revision of priorities which must precede such a commitment seems nowhere in sight.

One could go on and on, but Dr. Goldblith and others have already said it better. So let me simply suggest that the party responsible for the March cover shed his blinders long enough to absorb from the back issues of his own magazine a few of the realities of this pressing and quite unresolved problem.

John P. Holdren
Stanford, California

The writer is associated with the Institute for Plasma Research, Stanford University. —Ed.

The full quotation from Professor Wittwer's paper, upon which Technology Review's *March cover drew, appears on page 25: "One could surmise from all of this, and I will conclude with a note of optimism, that we have already witnessed the last great famine on this earth. I cannot agree with the advocates of world disaster that irremediable hunger is now, or will be stalking the earth in the near future. It is true that hundreds of millions suffer from malnutrition, and it is common today throughout the world—even in the U.S., where there is manifestly no excuse." The editor is aware of the dangers of quotations out of context and will leave to his readers the judgment, if any is required. Professor Wittwer's comments (above) are also relevant to much of Mr. Holdren's discussion.—Ed.*

M.I.T. and the National Defense

The following letter to President Howard W. Johnson of M.I.T. was submitted to Technology Review *to be published as a paid advertisement. Since it is our long-standing policy to accept advertisements only for goods and services (but not editorials), we present it here with the letters to the editor in reference to a "Special Report" in the May issue (pages 80A-80D).—Ed.*

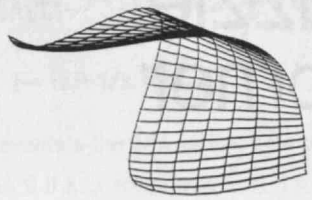
Dear Dr. Johnson,
The New York *Times* reports this morning (April 30) that at your orders M.I.T. has stopped accepting any secret government programs pending a re-evaluation of its position. It would seem to be appropriate for an alumnus to offer his strongly held convictions.

It is the responsibility of every citizen of a free nation to advance its safety and interests by every honorable means within his power. No nation in all history has been more worthy of the support of its people than the United States. Perhaps no time in all history has been more fraught with dangers than the present. Certainly never before in history have technical knowledge and ability been more important for the safety of our country and its people.

There is room and forum for debate on the wisdom and practicality of United States actions with regard to the arms race and Viet Nam. Such debate takes place continuously. The pompous "moral" arguments so often heard that American intervention in Viet Nam is a sin of a magnitude comparable to that of Hitler's Germany justifying the complete renunciation of all loyalty to the nation are imbecilic drivel unworthy of consideration. For any citizen or institution of a free nation to try to weaken that country by undermining its powers to defend and assert itself in a dangerous world is treason in the full meaning of that terrible word. Furthermore, to attempt to interfere with the Poseidon missiles upon which the physical survival of this nation's population may depend is suicidal insanity. To oppose further development in the helicopters needed to evacuate wounded American soldiers is atrocious inhumanity.

Were M.I.T. to refuse any further secret government contracts because it did not wish to strengthen and aid the United States of America, it would become an institution which I could not support or be associated with in any way. I am astounded and ashamed that this institution, which I have loved and admired, should even be considering such a step.

Harry G. Parke
Brooklyn, N.Y.



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Puzzle Corner

Allan J. Gottlieb

Hi. In all fairness to Dynaco, I must mention that several readers have reported to me that, although they die at the sight of a D.E., their hi-fi equipment works fine.

The answers to problems published in the May and June issues of *Technology Review* will appear next October, in the first issue of Volume 72. Next month, the last issue of Volume 71, I'll print no new problems—only the solutions to problems published in March. So these are the last new problems to be published for four months.

Thanks to a recent surge of problems, we have a medium (six- to twelve-month) backlog; so please be patient if your proposed problem does not appear until well into next year.

Problems

36 Consider the function N(R,x) defined (for R a positive integer and x a complex) by

$N(1,x) = x^x$

$N(2,x) = x^{N(2,x)}$

. . .

$N(k,x) = x^{N(k,x)}$

Richard Lopes wonders if it can be continuously extended to R to be any real (or perhaps any complex) number.

37 Douglas J. Hoylman asks you to evaluate

$$\int_0^\infty \frac{x^3 dx}{e^x - 1}.$$

38 Russell A. Nahigian can show that

$$\frac{abc,abc}{77}$$

is always an integer. Can you?

39 Marshall Greenspan claims

$$\sum_{i=1}^{n} i^3 = \left[\sum_{i=1}^{n} i \right]^2.$$

Prove, or give a counterexample.

40 The following, from Donald E. Savage, is a really cool problem; he calls it a "loyal" puzzle:

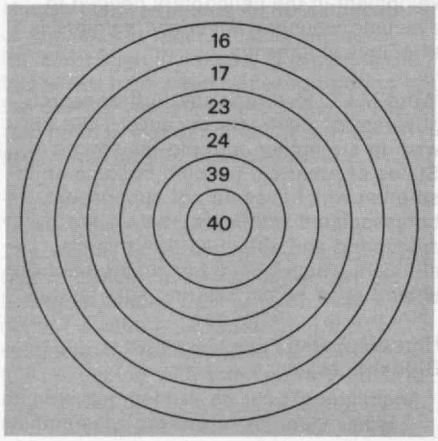
Plot, using Cartesian coordinates, the following equation:

$$\left[2y - \frac{5|x|}{1 + e^{A(|x|-16)}} - \frac{\sqrt{1 + \frac{10}{A} - \left(\frac{x}{16}\right)^2}}{A} \right] \cdot \left[A^2 (x-30)^2 + \left(\frac{y}{20} - 1\right)^2 - 1 \right] \cdot \left[y - 40 + 40\, e^{-A(x-53)^2} + \frac{\sqrt{1 - \left(\frac{X-53}{16}\right)^2}}{A} \right] = 0$$

where A is some large positive number, such as 1000.

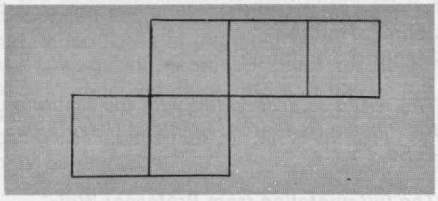
Speed Department

This is from Alec Henderson:
SD17 Using the following dart board, how many darts would you need to score an exact 100?



SD18 Mr. Hoylman wants you to punctuate the following:
That that is is that that is not is not is that it it is.

Correction: Please note that the figure for **SD12** (page 98, April) was incorrectly drawn. Hence the problem is repeated:
SD12 Mr. Nahigian wants you to move two matchsticks and change the figure below into a figure consisting of four equal squares.



Solutions

21 Each time his automobile gasoline tank is half full the owner fills it, alternating between regular fuel (92 octane) and premium fuel (100 octane). Assuming that he has been doing this for some time, what is the octane level of the fuel in the tank after he has filled it with regular fuel? (Assume that 10 gallons of 92-octane fuel plus 10 gallons of 100-octane fuel yields fuel of 96 octane.)

The following is from Donald S. Fraser:
"More than one solution is possible, and mine—unlike the ones you usually receive for Puzzle Corner and may receive for this problem—are simple and straightforward.

"Solution 1. The problem assumes that the commuter has been mixing the given fuels in the prescribed manner for some time in his gasoline tank. However, it does not state that the tank at the point in question actually contains 10 gallons of blended fuel. The tank could be empty which he now "has filled with (his) regular fuel." A facetious answer therefore is 92 octane level.

Comment: The commuter in the problem appears confused about the market grades of motor gasoline. In a three-grade service station, "regular" is the middle quality averaging 95 (research

method) octane, not 92, as stated. This latter is generally termed "sub-regular." A two-grade station normally dispenses 100 octane premium and 95 octane regular gasolines.

Solution 2. The commuter's engine knocks on 92 octane gasoline but does not knock with any of the blended fuels possible under the terms of the problem, not even with the 92+ obtained whenever 92 octane fuel is added to the tank mixture. A "tiger" is unnecessary in this situation, and following Warren K. Lewis' famous simplifying assumption hypothesis in chemical engineering principles, the solution is that the commuter should use "regular" gasoline, not the "sub-regular" mentioned in the previous paragraph. Good "orange disc" gasoline will provide a better octane cushion than the 92+ gasoline against knocking in his engine. It also should be less expensive than the described blended fuel procedure at present service station price differentials for the three grades of gasolines mentioned, and require less frequent stops for gasoline.

Also solved by Eric Callis, W. R. Campe, Edward Friedman, Arthur Hauser, Jr., John L. Joseph, Paul Karger, Stephen Owades, John E. Prussing, Frank Rubin, John Rudy, W. Allen Smith. and S. D. Turner.

22 If a pair of triangles is not co-polar, the joins of corresponding vertices form a triangle and so do the intersections of corresponding sides. The original pair of triangles has been transformed into a second pair which can be transformed into a third, and so on. How does the sequence of pairs of triangles behave?

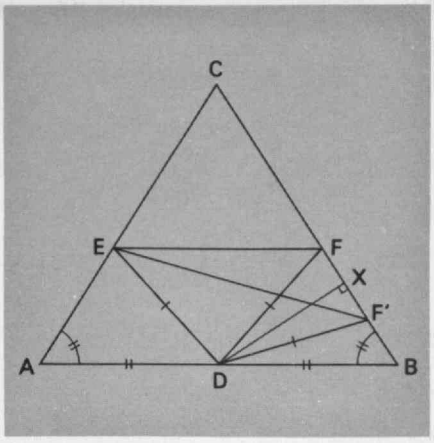
No takers so far. Keep at it.

23 Given an isosceles triangle DEF whose vertex D is the midpoint of the base of an isosceles triangle ABD. Prove that FE is parallel to AB.

Many people noticed that this problem cannot be solved. The best explanation is from Danny L. Taylor, who begins by noting a typographical error in the original publication of the problem (and repeated above): "If D is the midpoint of the base of an isosceles triangle ABD, then this is a very degenerate situation and therefore FE and AB are not parallel but colinear. Therefore, I assume the reference is to isosceles triangle ABC and submit the following:

"Consider isosceles triangle ABC with D the midpoint of the base AB. Construct DX perpendicular to BC. Set point F' (not X) on XB such that XF' $\leq$ XC. Set point F on XC such that FX = XF'. Construct isosceles triangle DEF with vertex at D.

"Now DX is a segment of the perpendicular bisector of FF' and therefore DF = DF' by definition of perpendicular bisector. By definition of isosceles, DE = DF and therefore DE = DF' by transitivity. Therefore DEF' is also an isosceles triangle whose vertex is the midpoint of AB. Since both triangles DEF and DEF' satisfy the conditions of the problem, an affirmative proof would require both EF and EF' to be parallel with AB. This necessitates ignoring Euclid's parallel postulate, which takes us out of the realm of plane geometry and disproves the hypothesis."



Also solved by R. A. Bender, Richard Grant, Henri M. Gueron, Mrs. Martin S. Lindenberg, John McNeir, Peter Ross, Albert Yuncht, Jr., Messrs. Hauser, Joseph, Karger, Owades, Rubin, Rudy, and Turner, and the proposer, William J. Wagner.

24 For the case n = 10, x = ½, analytically evaluate the infinite series:

$$\sum_{k=1}^{\infty} [a_k k(k+1) + x^k [k - (-1)^k]/k]$$

where

$a_k = \frac{1}{2} [1 + \text{signum } (n - k + \epsilon)]$, $0 < \epsilon < 1$.

This was solved only by Frank Rubin, who included a lucid description of "signum," and the proposer, John E. Prussing. Mr. Rubin's response is reprinted here:

"This one is sort of a hodge-podge of three series thrown together:

$$S = \sum_{k=1}^{\infty} a_k k(k+1) + \sum_{k=1}^{\infty} (\tfrac{1}{2})^k - \sum_{k=1}^{\infty} (-\tfrac{1}{2})^k 1/k.$$

To evaluate the first series, note that

$a_k = 0$ if $k > 10$; and $a_k = 1$ if $k \leq 10$.

So $\sum_{k=1}^{10} k(k+1) = 440$.

The second series of course has value 1. The third series is recognized as logarithmic, in this case — log 3/2. Then S = 441 + log 3/2.

"Signum, incidentally, is not a new but a very old notation for the sign of a number:
Sgn (x) = signum (x) = —1 if $x < 0$, = 0 if x = 0, and = 1 if $x > 0$.
It is commonly used in conjunction with trigonometric functions in various quadrants and with square roots. A more common signum function refers to the sign of a permutation and is used in the expansion formula for a determinant

$$|(a\ i\ j)| = \sum_{\pi} \text{signum}(\pi) a_{1\pi(1)} \ldots a_{n\pi(n)}$$

sum taken over all permutations, π, of the numbers 1 to n."

Mr. Gottlieb, who graduated from M.I.T. in mathematics in 1967, is a teaching assistant at Brandeis University. Send answers and problems to him at the Department of Mathematics, Brandeis University, Waltham, Mass., 02154.

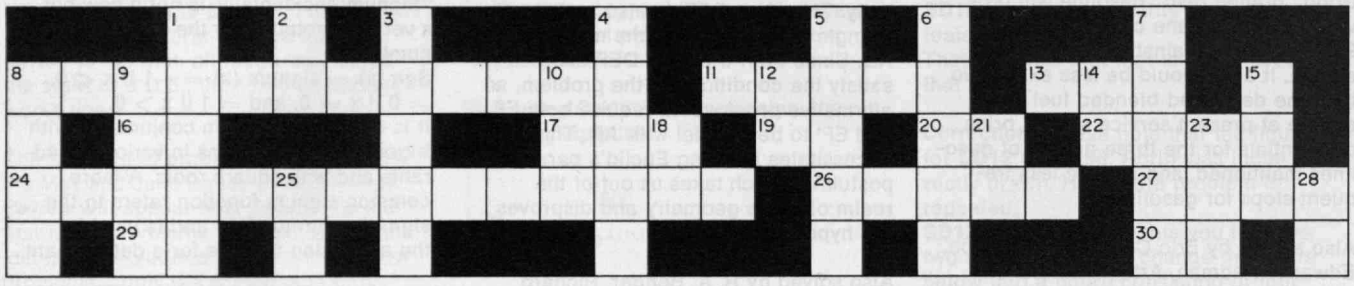
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Technological Crossword

John M. Sandor



Tech-Crostic

The correct solution to the Tech-Crostic by David L. Holt, published in *Technology Review* for May, is the following quotation from Sir James Jeans' *Dynamical Theory of Gases*:

"A dynamical problem may in accordance with accepted usage be said to be one of statistical mechanics when the data and objects of inquiry are not the actual values of the various coordinates but the law of distribution of these coordinates."

At press time, the following *Technology Review* readers had qualified for copies of *A Scientist Speaks,* excerpts from addresses by the late Karl T. Compton, ninth President of M.I.T., by being first in their states to send correct solutions to Professor Holt:

California: William J. Wagner, San Carlos, and Creve C. Maples, Jr., Berkeley
Connecticut: Mr. and Mrs. Burns Woodward, New Haven
Florida: R. W. Flynn, Tampa
Illinois: M. Charles Cheney, Chicago
Indiana: H. M. Oshry, Crawfordsville
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Maryland: Frank H. Libman, Westminster
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Ohio: George Piotrowski, East Cleveland
Oklahoma: Robert Rein, Norman
Tennessee: Mr. and Mrs. H. K. Payne, Hixson
Texas: Stanley G. Reiff, Ft. Worth
Vermont: Mrs. Martin Lubin, Norwich

Clues across:

8. This is the beginning of the end, and the end of the beginning! (12)
11. A mistake often accepted as standard practice? (5)
13. You may enjoy the water in this particular resort. (3)
16. This Greek well may be found in the Spanish United States! (2)
17. Old-fashioned, backward, and usually in the company of two, by the sound of it. (3)
19. A public prosecutor shortly is arriving from Italy . . . (2)
20. . . . because of a little arsenic incident. (2)
22. The 'Tute figures briefly in the current month. (4)
24. The graduate student, though apparently disturbed, needs this ideal arrangement to fulfill his stringent requirements in time! (6,8)
26. Layers that are slim, broken, with loud coloring. (5)
27. Packs are frozen once the dice are thrown. (4)
29. Tea is served twice to those who abstain from alcohol! (2)
30. This force protects us against cadmium condensation. (2)

The contributor of the first correct solution to this month's Technological Crossword from *each U.S. time zone* will receive a subscription to Volume 72 of *Technology Review* for himself or for anyone whom he may designate. Send solutions to Mr. Sandor in care of *Technology Review,* Room E19-430, M.I.T., Cambridge, Mass., 02139.

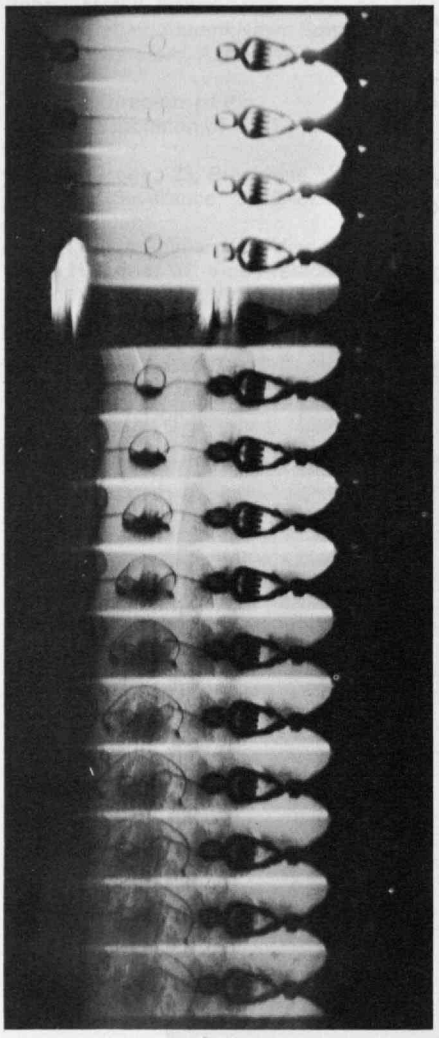
Clues down:

1. This is a necessity: team us together, and you'll see the result. (1,4)
2. An international organization which usually assumes a negative role! (2)
3. Serve upside-down and inside-out, and separate. (5)
4. Lay bare the story behind those obscure trips. . . . (5)
5. In a sense, you may wish this accepted in outline . . . in another, you may wish to be rejected outright! (5)
6. Rearrange the solar system so as to present your own ideas about it! (5)
7. Such feelings possess one all too often around this time! (5)
8. Name it: it is found surrounded by cerium. (4)
9. A fitting encounter? (4)
10. Packers have had this boxed up for years. . . . (3)
12. This research and design place is just down the road. (2)
14. A Greek letter sends us around in circles! (2)
15. It sounds like your number is up—and you will be consumed. (3)
18. This is concerning a reverse negative. (2)
21. (See 25).
23. (See 25).
25, 21, and 23. These three make up a series, are found in procession, and add up to a lot of science education! (2,2,3)
28. In short, this symbolizes the successful end of a graduate career. (2)

Mr. Sandor, a graduate of the University of Cambridge, is studying for his doctorate in the M.I.T. Department of Metallurgy.

Strobe Probe

Harold E. Edgerton



Exploding Wire

Brass wire 0.45 mm. diameter of 5 cm. length, with 0.5-cm. diameter loop at center between two clips is shown backlighted with an FX-2 xenon lamp driven by an E G & G Multiflash type 502 at 50,000 flashes per second. The wire was exploded by the discharge of a 40-mfd. capacitor at 4 kv. through a hydrogen thyratron and a series resistance of 0.125 ohms. Film (type 5305) on a 1-ft. diameter wheel was rotated at 5400 r.p.m. The action occurs at the fourth frame from the top (note the spark flame image on the edge of the film at the clip due to poor electrical contact). At the fifth frame the light was dim from the strobe; reason unknown. At the sixth frame, note the shock wave intersection from sparks at the clips. Also, note the wire loop is *larger* than before! Apparently the wire is *stretching* without changing appreciably in diameter! The same effect is shown in the seventh and subsequent frames. The loop continues to grow in size even if the bottom of loop is melted by contact.

Question: Why does the wire stretch instead of explode?

Answer: No answer is known, and the author will welcome readers' comments, sent to him in care of *Technology Review,* Room E19-430, M.I.T., Cambridge, Mass. 02139.

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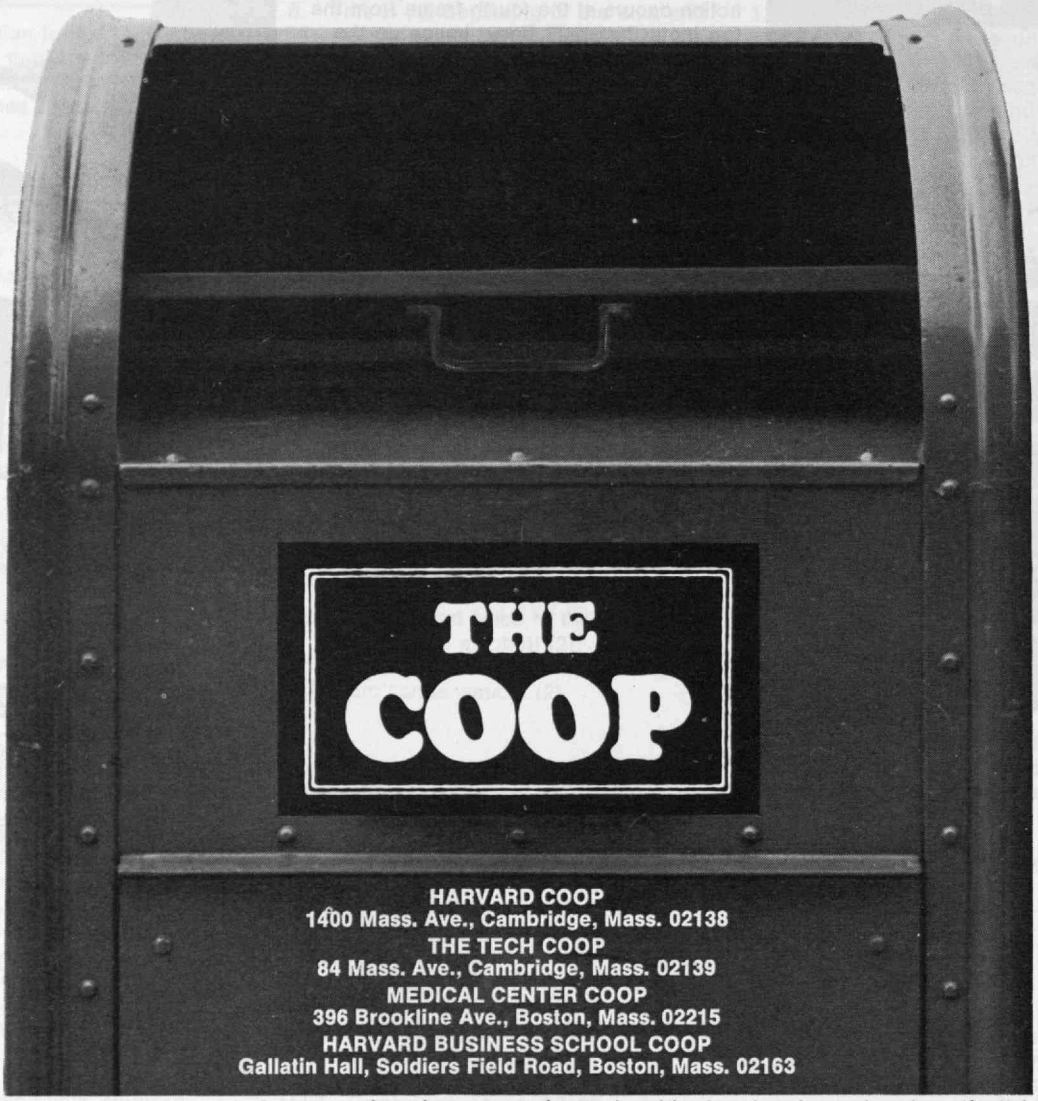
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community
for
June, 1969

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Institute Review

"Agenda Days:" Achieving a " 'Critical Mass' of Concern"

No one can know everything—or even a small part of it—that happened at M.I.T. on May 7 and 8, when afternoon classes were cancelled for "Agenda Days" and the entire community was urged to engage together in what President Howard W. Johnson called "a bold experiment to test whether face-to-face communication on the widest possible scale is an effective device for improving M.I.T."

And no one can yet know how useful the result will be.

The Tech, though admitting that the program did not "turn on" the entire community, said the thousands who attended the more than a hundred meetings had "a unique and spontaneous educational experience which will have subtle, long-term effects as well as the more immediate consequences." The participants will constitute, said the editors, "a 'critical mass' of concern" for future discussions of Institute affairs.

The plan for two days of discussion grew among students and faculty alike after what amounted to a flood tide of interest in issues confronting M.I.T.—and most educational institutions—this spring: curriculum reform, community relations, defense research, R.O.T.C.

An "Agenda" of Unfinished Business

Preparing for "Agenda Days," the committee asked everyone in the community to provide his list of discussion topics. The result was a serious catalog of issues as well as a compilation of frustrations. Samples: the need for defense-related research at M.I.T., the morality of weapons research, the transfer of technology to urban affairs, technology and medical needs, the causes of current social unrest, M.I.T. student involvement in Cambridge education, the meaning of academic performance today, the role of living groups in the total educational experience, alternative methods of funding research, the role of the intellectual in social change, financial aid and admissions at M.I.T., and the social sciences in the political arena.

When it was all over, each of more than 100 discussion groups was asked to make a report to the sponsoring committee, whose job it is to form this into M.I.T.'s "agenda" of unfinished business. The reporters found their jobs difficult, and the committee's will be more so.

Few of the groups' many comments were formalized by conclusions, resolutions, or votes; consensus was neither expected or needed. One exception was a group composed largely of students and faculty from the Department of Physics (but not an official Department meeting, as erroneously reported by some of the press) which resolved that M.I.T. should halt work on guiding multiple-missile warheads to military targets.

No count is possible, but surely 5,000 members of the Institute community joined in one or more of the days' programs. The Department of Naval Architecture's meeting extended into a "chicken and beer" supper; the Muddy Charles, graduate student social headquarters, sold more beer than on any other day in its history; and the Department of Electrical Engineering quite naturally carried its discussions into the traditional "steak fry," happily scheduled for an evening of one of the two "Agenda Days."

Talk Must Be Followed by Action

The stage was set by President Johnson at an opening convocation on May 7: "Although much of what we have is first-rate, much of what we have could be better. Higher education is in the midst of major revision. It is our aim to make that revision work for M.I.T.—for the whole of the M.I.T. Community—and this free and open discussion should help us understand each other."

But he went on to emphasize that the "principle of generating effective ideas should not be confined to the talk stage. It must be carried into the decision-making process itself. . . . There must not be the letdown in hope and effort that would result if there is no visible follow-through. This makes it very important that practical next steps become one of the things that we consider.

"To me," said the President, "this bold approach to solving the problems that face us—to organize ourselves to solve them, to decide the directions for M.I.T.—is what this place is all about. . . . M.I.T. does not belong to any of us alone—students, faculty, administration, Corporation or alumni, or to the nation. It belongs to each of us and to history."

To some observers of the drama the script seemed less important than the cast. For it is unusual—perhaps unique—in M.I.T. experience for students, faculty, administration employees, and alumni to join in discussing such issues as how much of an undergraduate curriculum should be given to fundamental theory and how much to practical design, how national priorities can be changed, how research projects can most usefully contribute to education, how dormitory and fraternity life can be enriched, how an M.I.T. education can help students from developing nations.

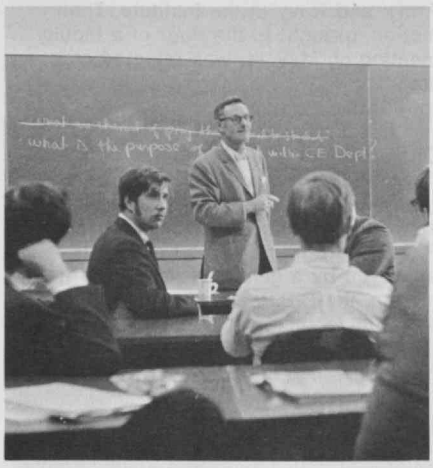
"Influence and Communication"

The following are excerpts from "Agenda Days" reports reaching the committee after M.I.T.'s two-day effort to define issues and to open discussion of them:

"It was agreed that there is currently a general lack of direct student input in department matters, even though in many cases the students have both interest and competence. Although some of the students wanted 'voting power' on such topics as faculty appointments, graduate school admissions, and curriculum revision, many of those present felt that the important issue was influence and communication and opposed any voting changes."

"Unspecified funds should be made available for student 'contract research'. The professor would be released from total responsibility for research funding and the student would be free to consider a broader range of thesis topics."

"The undergraduates . . . were delighted with the meeting in that they had a chance to get together with graduate students in a group, and with faculty. Both the undergraduate and graduate students wanted to know a good deal about the operation of the Department. Many of the faculty, in turn, were really taken back by the lack of knowledge







Samples of "Agenda Days" conversations picked up by Technology Review *reporters:*

"I really can't understand why you insist on requirements."

"It's exceedingly difficult for even a conscientious faculty member to know the details of all M.I.T. curricula. The reason for requirements is to simplify the adviser's problem by showing sequences."

"One good thing about general requirements is that they protect students from departments who want to impose requirements and eliminate electives."

"I just had to translate a paper from German. It was hard going, but if I hadn't had my language requirement, forget it."

"What is missing in the present core curriculum? How to think—how to really achieve a civil engineering solution."

"What's wrong with the humanities? Look at all this trivial garbage! It's not doing me any good."

"Couldn't the mind be formed as well in some other kind of institution?"

"I can recall when if you taught a course that didn't glisten with differential equations you were out of the mainstream of students. Is the engineering sciences jag really over?"

"The right of the student is freedom to learn. One of the social constraints is the need for a degree. But my freedom as a teacher is a constraint upon the university. Or is the university a constraint on your freedom?"

among the students of what the faculty erroneously took to be common knowledge."

". . . question the right of an institution such as M.I.T. to receive funds for urban research and the assumption that scientific knowledge has in itself the ability and power to impose moral values. The idea of technology as an end in itself is incompatible with the concept of the university as an institution which provides social services."

"Quickly the students . . . focused the discussion on the problem of the freedom of a scientist in a university to pursue research even though it may prove detrimental to his society, humanity at large, or both. They resolved that such freedom must be maintained but proposed that an 'Institute Research Committee' be established . . . to examine all projects of applied research proposed by members of the faculty as to their social relevance."

"M.I.T. undergraduate education should offer a wider range of opportunities to understand the environment within which the graduates will live and work—economic, political, social, spatial, and sensory—at scales ranging from the building through the city and region to the nation and the world."

"We start from the premise that the university's commitment to social service involves it in political action—even if this takes the form of passive service to the *status quo*. The responsibility of the university cannot be evaded by a retreat to the principle of political non-involvement; it is already deeply involved politically."

The committee also had communications from individual students:

"In the last few days we have developed a new awareness, a new confidence, and a new sense of community. It is important, I think, not to let that die here."

"Among the various questions and answers that Wednesday and Thursday brought out, one thing stands out to me. Why must the Institute remain politically acquiescent? . . . To me, it is a measure of the Institute's ties with the military-industrial complex that no public stands have been taken. This is the university as a critic of society?"

R.O.T.C. Confirmed

Two faculty votes at M.I.T. this spring reaffirmed the presence of R.O.T.C. on the campus and suggested a comprehensive study emphasizing the content and teaching of R.O.T.C. subjects and the granting of academic credit for them.

Many campuses throughout the nation experienced heated debate on R.O.T.C. programs this spring. Citing familiar arguments, a group of M.I.T. faculty had asked their colleagues to terminate the military training programs of Air Force, Army, and Navy at the Institute. Their motion, brought to the floor of a faculty meeting on May 14, was rejected on a standing vote by a margin estimated at four or five to one.

One week later the Committee on Educational Policy, pursuant to its instructions from the faculty, returned with a plan for studying possible alterations to present R.O.T.C. programs which the faculty approved by a generous margin. In its motion, the C.E.P. asked for a committee study to recommend whatever changes may be needed "to ensure an R.O.T.C. program which is compatible with normal academic procedures with respect to the establishment of subjects, the award of academic credit, the selection and appointment of teaching and administrative staff, and the contractual obligations of both students and the Institute."

President Howard W. Johnson said he would appoint the committee promptly, so that it can begin work this spring.

Total enrollment in M.I.T.'s three R.O.T.C. departments is 173. The combined staffs include nine officers, all of whom hold faculty appointments within their respective R.O.T.C. departments. One, a naval officer, holds simultaneous appointment as a professor of naval construction in the Department of Naval Architecture and Marine Engineering. Academic credit at present is awarded for only a few of the subjects taught by the R.O.T.C. departments themselves. Some R.O.T.C. requirements are met by taking subjects that are a part of the regular academic curricula of other departments at M.I.T.

Restudying Educational Goals

After four months of arduous debate, the M.I.T. faculty early this spring refused the majority necessary to accept the recommendations of its Committee on Educational Policy—and, as well, the suggestions of four other student and faculty groups—to change M.I.T. curricula and graduation requirements.

Instead, there will be a major new inquiry, beginning before the end of this academic year, into the Institute's educational goals and how they may be achieved. Howard W. Johnson, President, told the faculty that this will provide a "searching study" of the basic premises of M.I.T.'s educational programs as well as such issues of their implementation as were before the faculty this spring. It will parallel in depth and importance the study of the Committee on Educational Survey under the chairmanship of Warren K. Lewis, '05, then Head of the Department of Chemical Engineering, from 1947 to 1950.

The proposals before the faculty this spring represented a spectrum of plans to retain or in some degree liberalize the Institute's present graduation requirements. The most conservative was to retain the present requirement of courses in physics, chemistry, and mathematics. The C.E.P. proposal was to eliminate the Institute-wide chemistry requirement and so provide more elective time in M.I.T. curricula.

The most radical of the plans was proposed by a group composed largely of students; it would have eliminated all "requirements" for graduation by substituting the word "suggestions," leaving the only absolute requirement of recommendation for the S.B. degree by the student's major department. Coupled with this proposal, which clearly had active support among the students attending the faculty meetings as observers, was a plan for extending and improving the faculty advisory system.

Curriculum changes require a two-thirds vote of the M.I.T. faculty. Though many students took the faculty's failure to agree as a defeat, *The Tech* noted that the faculty "is understandably confused when it is confronted with four different student proposals, none of which has the clear support of the whole student body, in addition to one from within its own ranks which has been two years in preparation." And, said *The Tech*, "it is not surprising that students might mistake the caution which results from faculty unease for intransigence."

The Complete M.I.T. Man (with Slide Rule) in Space

Apollo 9 was full of surprises, but almost all of them were little ones—and pleasant ones—at that. In a sense, said Russell L. Schweickart, '56, Lunar Module pilot on the flight (*see* Technology Review *for May, pages 34 to 43*), just being there was the biggest surprise of all. When he and his colleague, David R. Scott, E.A.A. '62, Command Module Pilot, were in Cambridge as students, no one really thought that the U.S. could hope to be on the moon in less than 10 years—if ever.

The best surprise was the guidance system, said both Scott and Schweickart when they came to Cambridge for a nostalgic visit to their alma mater and to officiate at Open House on May 3 (*see below*).

"It was absolutely spectacular," they agreed—"better than in any of the simulations." Their enthusiasm was not lost on the M.I.T. community, for the guidance and navigation equipment was designed at M.I.T.'s Instrumentation Laboratory.

The most serious surprise—Schweickart's occasional nausea in the early states of the flight—should perhaps not have been a surprise after all, he said in a private review of the mission for M.I.T. Instrumentation Laboratory workers and their families. Russian cosmonauts and some other Apollo astronauts had the same experience of "cabin sickness" before him, and the whole problem is now the subject of "most intensive investigation," Mr. Schweickart reported. The best present guess is that nausea is associated with freedom for motion in space —since this kind of sickness was not experienced by Mercury and Gemini as-

tronauts, whose capsules were too small for their occupants to move about.

Complexity Multiplied

Everyone was surprised at the complexity of the Apollo 9 mission—and of the systems upon which it depended. Considering both spacecraft and lunar orbiter, there were eight configurations of equipment to be tested ("Did we really get all that done?"). The astronauts made 1400 still pictures during the flight—and haven't yet had time to study them all.

Apollo is "an infinity of simple devices" linked into complex systems, said Schweickart—so complex that they cannot all be learned. The only solution is to "go step by step, staying close to the script," said Scott. Only under emergency conditions when there is no alternative could an astronaut attempt to "perform off the top of his head."

Each astronaut wears so much equipment attached to the spacecraft through hoses that living inside the capsule "is like living in there with an aggressive six-armed black octopus," said Scott.

Robert C. Duncan, Sc.D.'60, formerly Chief of the Guidance and Control Division of N.A.S.A. who appeared with Schweickart and Scott at the Instrumentation Laboratory briefing, called the successful flight and maneuvers of the Command and Lunar Module, "the greatest technical achievement ever made in space." Noting that this vehicle could not leave or enter the earth's environment, Scott said that this first Lunar Craft flight was "like running a flutter test at Mach 2 on the first flight test of an aircraft."

How To Be an Astronaut

What about an M.I.T. background for astronauts? Schweickart and Scott were asked by students during their campus visit. Scott noted that his graduate studies concerned the guidance of an unmanned spacecraft on a lunar voyage. Schweickart did similar technical studies at M.I.T., but he said he would not have become a pilot or later an astronaut without his Air Force R.O.T.C. training as an M.I.T. undergraduate.

Like all good M.I.T. men, Schweickart said, he carried his slide rule on the flight. But he couldn't remember where it was stored or how used. To a student who asked how to get into the astronaut program, Schweickart said that cuts in the space program make it unlikely that many more astronauts will be chosen soon. "You may be too old already," he said. When a co-ed asked about women in space, Schweickart ventured that "it won't happen in the immediate future." But "keep plugging," he said.

"Much of What I Am Began in Massachusetts"

The official count was nearly 20,000 visitors on May 3, but the high point of Open House for the M.I.T. community may in fact have come the day before, when a helicopter fanned down onto Briggs Field bringing Russell L. ("Rusty") Schweickart, '56, Lunar Module pilot of Apollo 9, back home.

When Russell R. Schweickart, '56, Apollo 9 Lunar Module pilot, dropped out of the sky onto M.I.T.'s Briggs Field on May 2, television cameras and the M.I.T. lacrosse team were both waiting for him. He took on the reporters first, then joined in a short work-out with his proud hosts.



After talking briefly with newsmen, Mr. Schweickart happily autographed baseball caps, lacrosse sticks, and whatever else happened to be handy; and then he joined students in a brief physical workout. Next day, at the official opening ceremonies for Open House, he told a packed crowd outside the Student Center that "it's a special pleasure to be back here where I formed much of my basic character. Much of what I am began in Massachusetts," he said.

In addition to Mr. Schweickart, Astronaut David R. Scott, S.M.'62, Apollo 9 Command Module pilot, and President Howard W. Johnson shared the platform at the opening ceremonies.

Open House featured demonstrations of M.I.T.'s most sophisticated tools of science but emphasized what life is like at the Institute. There was activity in the studios of the Student Art Association in the Student Center; M.I.T. Urban Action, the student social service agency, showed the imaginative educational games used in its successful tutoring program; there was a special Saturday matinee of the Dramashop's production of "We Bombed in New Haven;" and Gretchen Dean, an M.I.T. graduate student in the Center for Advanced Visual Studies, presented an "image/sound projection environment" called "Immaterials" in the M.I.T. Chapel.

Computers were programmed to play tic-tac-toe and checkers with visitors, and an Apollo space capsule mock-up gave guests a chance to personally try out the environment the astronauts work in. "Strobe Alley," the headquarters of Harold E. Edgerton and his associates in the Department of Electrical Engineering (*see* Technology Review's *monthly "Strobe Probe" feature*) was also popular.

A Carnegie Hall Debut Reveals "Hours of Solid Work"

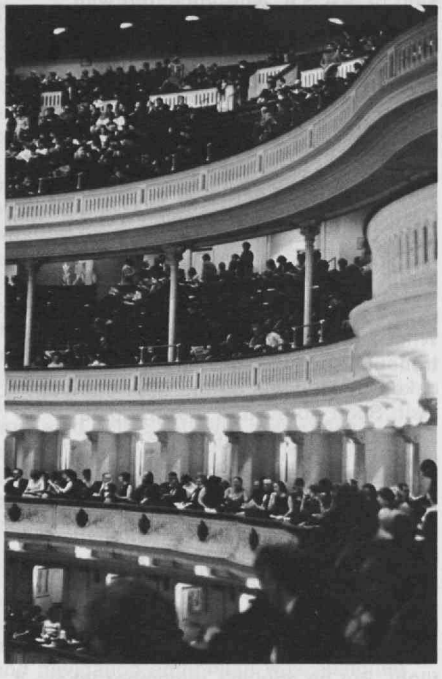
A full house—over 2300 listeners, mostly members of the M.I.T. Alumni Center of New York and Wellesley Alumnae in the New York area—greeted the M.I.T. Symphony at its premiere performance in Carnegie Hall on April 17. The thrill of playing on that famous stage was fulfilled for the Orchestra when Theodore Strongin of *The New York Times* wrote that the group "showed a precision in basic orchestral matters that must represent hours of solid work."

The program, conducted by David M. Epstein, Associate Professor of Music, included Rossini's "The Italian Girl in Algiers" Overture, Bartok's "Dance Suite," the first New York performance of Sven-Erik Back's "Intrada per Orchestra," and Mozart's two-piano Concerto in E-flat, in which John Buttrick and Robert S. Freeman, both Assistant Professors of Music, were soloists.

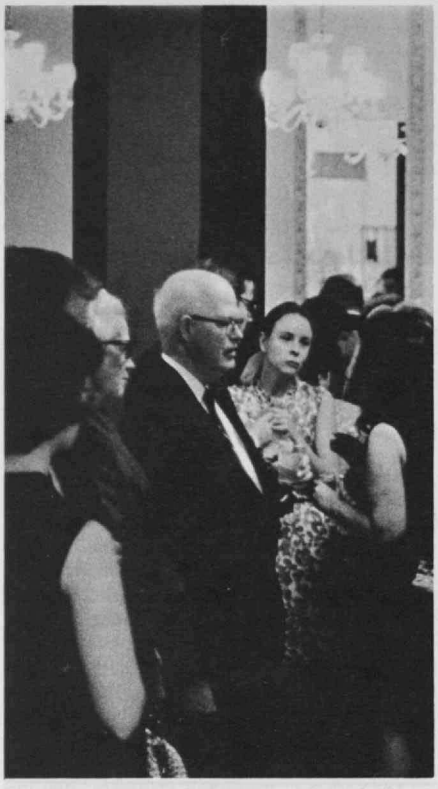
The M.I.T. Orchestra's New York appearance, said Mr. Strongin, was "a sign of the burgeoning importance of the arts in that technological and scientific institution."







It was a gala night for the Institute when the M.I.T. Symphony Orchestra made its New York debut in Carnegie Hall on April 17 before a full house of nearly 2400 alumni and friends. The program included the New York premiere of the "Intrada per Orchestra" by the contemporary Swedish composer Sven-Erik Back and the Mozart E-flat Concerto (Number 10), whose soloists—John Buttrick and Robert S. Freeman, both Assistant Professors of Music at M.I.T.—were warmly applauded by orchestra and audience alike.



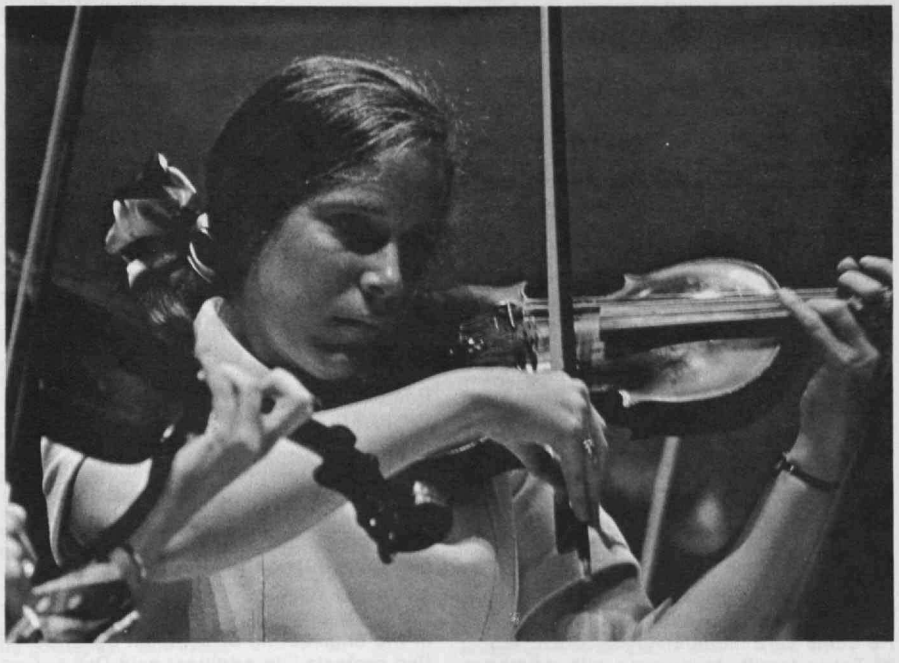












Before the Carnegie Hall concert there was a reception for members of the M.I.T. Alumni Center of New York (top, right: Julius A. Stratton, '23, President Emeritus of M.I.T., with Mr. and Mrs. John W. Kunstadter ('49)) and a late-afternoon rehearsal on the famous stage for members of the M.I.T. Symphony. (Photos: Richard M. Koolish, '68)



W. J. Hecht, '61



T. William Lambe

M.I.T.'s Winners in Math

For the first time in its history, an M.I.T. team of student mathematicians finished first this year in the annual William Lowell Putnam Examination. They competed against 252 other college teams, and part of their prize was $500 for the M.I.T. Mathematics Library.

Two members of the official M.I.T. team, who also competed in the Putnam individual competition, placed among the top five of the 1,398 individual competitors; they were Gerald S. Gras, '69, and a freshman, Don Coppersmith, '72. The third member of the team, Jeffrey C. Lagarias, '71, won an honorable mention in the individual competition.

In years past, M.I.T.'s math teams entered in the Putnam competition have only won a "galling" second place, says W. Gilbert Strang, Associate Professor of Mathematics, a member of the faculty committee which selects the M.I.T. team. However, he explained, this may have been due to the modesty of some of the 30 individual competitors who neglected to tell the team selection committee how good they really were.

Academic Frustration

Walt W. Rostow, the controversial Special Assistant in President Lyndon B. Johnson's administration who was Professor of Economics at M.I.T. before 1961, returned to Cambridge on April 10. He came as a member of the University of Texas faculty to discuss with members of the M.I.T. Center for International Studies the topic of his current research: the political evolution of underdeveloped countries—why some nations succeed in political development while others fail.

Learning of Professor Rostow's plans, M.I.T. students asked that "the chief architect of U.S. Vietnam policy" also speak to the Institute community at an open meeting. Professor Rostow agreed, but he never had a chance. Radical students, determined that Professor Rostow's views were intolerable ("he has been speaking for eight years already and that is long enough") asked unanswerable questions and interrupted their guest's efforts to answer them.

Dr. Rostow managed only part of one answer on the objectivity of social science: "I believe in the rules of scientific discipline, but there is no such thing as objectivity . . ." and part of another on Vietnam. ". . . the people of Asia want what everyone else in the world wants: a right to shape their own destiny on the basis of self-determination but not at the point of a gun."

Even the many in the audience who reject the U.S. role in Vietnam rejected as well the minority tactics which frustrated the traditional academic right to speak and listen freely. By April 15 nearly 2000 names had been signed to a petition supporting the right to a free exchange of ideas and the necessity that invited speakers, however unpopular, may present their views unharrassed.

Turner Professor

T. William Lambe, Sc.D.'48, who has brought distinction to M.I.T. through teaching and research in soil technology, soil behavior, soil dynamics, and soil engineering, has been named the first Edmund K. Turner Professor of Civil Engineering.

According to Jerome B. Wiesner, Provost of M.I.T., who announced the appointment, Dr. Lambe as Turner Professor "will play a broad leadership role in the Department of Civil Engineering," with "key responsibility for integrating the many specialized disciplines involved in the engineering of complex construction projects." In addition, said Dr. Wiesner, he will have "a department-wide role in teaching and research in civil engineering."

The new endowed chair honors the late Edmund K. Turner, '70, one of the first graduates of the Department of Civil Engineering.

Professor Lambe is the author or co-author of three books, including a new textbook on *Soil Mechanics,* written in collaboration with Robert V. Whitman, Sc.D.'51, Professor of Civil Engineering, which represents a new approach to teaching soil mechanics. Professor Lambe is the author of over 60 professional papers; he holds the Collingswood and the Arthur M. Wellington Prizes, the Norman Medal of the American Society of Civil Engineers and the Desmond Fitzgerald Medal of the Boston Society of Civil Engineers; and he will be the 1969 Terzaghi Lecturer of the Soil Mechanics Division of A.S.C.E. His engineering practice has involved projects throughout the U.S. and in South America, Africa, and Asia.

Educational Council Director

William J. Hecht, '61, has been appointed Director of the M.I.T. Educational Council, succeeding William H. McTigue, '54, who returns to the practice of civil engineering with the Cambridge consulting firm of Haley and Aldrich.

Mr. Hecht came to the Educational Council as Executive Secretary in 1967, following work in the field of personnel management for the New York Telephone Company and the United Aircraft Research Laboratories. He studied in the Sloan School of Management at M.I.T.

The Educational Council now comprises over 1000 M.I.T. alumni throughout the world who, through contacts with secondary schools, counsel young men and women interested in the types of education offered by M.I.T.

A Breath of Fresh Air

The need for collaboration between engineering and the medical sciences is no new idea (*see* Technology Review *for January, pp. 47-49*). But engineering may have more to offer than new devices for laboratories and operating rooms; it may also hold the key to new tools and even to a new approach for the delivery of health care, Dr. Irving London, Chairman of the Department of Medicine at Albert Einstein College of Medicine, told a Karl Taylor Compton seminar at M.I.T. this spring.

Though new technology has made possible remarkable gains in medical science, it has not yet affected the form and method of bringing care to those who need it. The network of medical service remains "so intricate that people can find neither the entrance to its maze or the route through it," said Dr. George

A. Silver, who is about to become Professor of International Health at Yale University.

The result is a growing discontent with medical care on the part of many—including even future doctors. Indeed, medical students are so frustrated by the imbalance between sophisticated medical science and elementary public need that their "tendency is to give up on the whole process," said Dr. Joseph T. English, formerly Assistant Director for Health Affairs of the Office of Economic Opportunity who has recently joined the National Institute of Mental Health, reporting "an alarming series of meetings" with U.S. medical students.

Dr. London suggests that the engineer's direct approach, and his specialized tools for bringing technology to management, may be the breath of fresh air needed to stir medicine out of its lethargy. And Dr. Silver urged that students must participate in this effort, if it indeed can materialize. The lesson should not be lost on those planning the joint program in technology and medicine between M.I.T. and the Harvard Medical School which, he said, would become effective in about 12 months.

Faculty Promotions

The promotion of 43 members of the M.I.T. faculty to the rank of professor and of 46 to the rank of associate professor was announced by Jerome B. Wiesner, Provost, following the spring meeting of the M.I.T. Corporation.

The new professors and their departments are:
Douglas P. Adams, Mechanical Engineering
Alan Altshuler, Political Science
James M. Austin, Sc.D.'41, Meteorology
Glenn A. Berchtold, Chemistry
Joseph Bicknell, '34, Aeronautics and Astronautics
Stephen L. Chorover, Psychology
Robert L. Coble, ScD.'55, Metallurgy and Materials Science
Jack B. Dennis, '53, Electrical Engineering
Thomas H. Dupree, '55, Nuclear Engineering
Joseph D. Everingham, Humanities
Aaron Fleisher, Sc.D.'50, Urban Studies and Planning
Merton C. Flemings, '51, Metallurgy and Materials Science
Jerry A. Fodor, Humanities
Bernard J. Frieden, Ph.D.'62, Urban Studies and Planning
Bernard S. Gould, '32, Biology
Kent F. Hansen, '55, Nuclear Engineering
August L. Hesselschwerdt, '31, Mechanical Engineering
Marcus Karel, Ph.D.'60, Nutrition and Food Science
Jerrold J. Katz, Humanities
Gordon M. Kaufman, Management
Daniel J. Kleitman, Mathematics
Francis F. Lee, '50, Electrical Engineering
Deane Lent, '42, Mechanical Engineering
Paul W. MacAvoy, Management
James R. Melcher, Ph.D.'62, Electrical Engineering
Reginald E. Newell, Sc.D.'60, Meteorology
Seymour A. Papert, Mathematics
Paul L. Penfield, Sc.D.'60, Electrical Engineering
Robert R. Rathbone, Humanities
Frederick Sanders, Sc.D.'54, Meteorology
Irving Singer, Humanities
Eugene B. Skolnikoff, '49, Political Science
Joseph L. Smith, Jr., Sc.D.'59, Mechanical Engineering
Prescott A. Smith, '35, Mechanical Engineering
Judith J. Thomson, Humanities
Richard D. Thornton, Sc.D.'54, Electrical Engineering
Samuel Ting, Physics
Harry L. Van Trees, Sc.D.'61, Electrical Engineering
Harold Y. Wachman, Aeronautics and Astronautics
Minor White, Architecture
Wayne A. Wickelgren, Psychology
Emmett A. Witmer, Sc.D.'51, Aeronautics and Astronautics
Gerald N. Wogan, Nutrition and Food Science

The new associate professors and their departments are:
David Adler, Electrical Engineering
Thomas J. Allen, Ph.D.'66, Management
Stanford O. Anderson, Architecture
Thomas A. Belote, Physics
Samuel W. Bodman, III, Sc.D.'65, Chemical Engineering
Edwin D. Bransome, Jr., Nutrition and Food Science
Richard J. Briggs, '59, Electrical Engineering
Charles T. Cole, Humanities
Wallace B. S. Crowston, S.M.'59, Management
Michael J. Driscoll, Sc.D.'66, Nuclear Engineering
Duncan K. Foley, Humanities
Lynn W. Gelhar, Civil Engineering
Ira S. Gerstein, '58, Physics
Stephen Grossberg, Mathematics
Norman D. Ham, Sc.D.'68, Aeronautics and Astronautics
Walter M. Hollister, '53, Aeronautics and Astronautics
Estil V. Hoversten, Electrical Engineering
Willard R. Johnson, Political Science
Daniel S. Kemp, Chemistry
Rene P. V. Kiparsky, Ph.D.'65, Modern Languages
Thomas J. Lardner, Mechanical Engineering
Bernard Maskit, Mathematics
Travis R. Merritt, Humanities
Borivoje B. Mikic, Sc.D.'67, Mechanical Engineering
David B. Montgomery, Management
Stewart C. Myers, Management
Alan V. Oppenheim, '59, Electrical Engineering
Igor Paul, '60, Mechanical Engineering
Whitman A. Richards, '53, Psychology
Jose M. Roesset, Sc.D.'64, Civil Engineering
Kenneth C. Russell, Metallurgy and Materials Science
Herbert W. Schnopper, Physics
Michael S. Scott Morton, Management
Marlan O. Scully, Physics
Jeremy F. Shapiro, Management
Robert J. Silbey, Chemistry
Albert Solbes, Ph.D.'65, Aeronautics and Astronautics
Barry B. Spacks, Humanities
David H. Staelin, '60, Electrical Engineering
Steven R. Tannenbaum, '58, Nutrition and Food Science
Donald R. Uhlmann, Metallurgy and Materials Science
Frederic Y. M. Wan, '59, Mathematics
Anwar E. Z. Wissa, Sc.D.'65, Civil Engineering
Bernhardt J. Wuensch, '55, Metallurgy and Materials Science
Ioannis V. Yannas, S.M.'59, Mechanical Engineering
Sidney Yip, Nuclear Engineering

Choosing the Class of 1973

Before one academic year rolls away, the next is coming up over the horizon: next year's freshmen have been invited.

Once again, one out of every three applicants was invited to attend M.I.T., and one out of every 4.6 will probably arrive in the fall. Once again, something like 7 per cent of the freshman class will be female, and, once again, this class will be smarter (in terms of test scores and grade averages) than the one before, which was smarter than the one before that, and so on.

However, there is a significant, small difference: whereas last year only 12 applicants identified themselves as black, this year, some 55 of those invited to M.I.T. have participated in programs aimed at helping the black high school student. Of these, 35—with 15 other students—have also been invited to spend the summer at M.I.T. as part of a pre-freshman educational program to enrich their preparation for the unique rigors of an M.I.T. freshman year.

Every applicant for the Class of 1973 had an interview; M.I.T. alumni did 87 per cent of the interviewing beyond the Cambridge campus. In all, 1412 of the total of 4430 applicants were offered admission; the class will total some 950 students, including 48 from foreign countries.

Budding Physicist

Lane Hughston, who will come to M.I.T. this fall as a member of the Class of 1973 (*see above*) from Dallas, Texas,



After 11 years as Director of the M.I.T. Reactor, Theos J. Thompson, Professor of Nuclear Engineering (left), has been nominated for membership on the U.S. Atomic Energy Commission. (Photo: Herbert Capwell, Boston Globe)

has already received science honors for a project in which he examined previous cosmological models of the creation of the universe and then tried to evolve his own model. He was one of 40 finalists (from 21,000 entries) and finally won first prize—a $10,000 college scholarship—in the 28th Annual Talent Search contest conducted by the Westinghouse Educational Foundation and Science Service.

During a five-day visit to Washington finalists displayed their experiments and visited government science installations and universities; 17-year-old Hughston addressed physics and mathematics scholars at the University of Maryland. During the week he also told *Science News:* "I was lucky in that our high school had a computer. For this kind of work you don't use a lot of laboratory apparatus. Aside from the computer, all you need is paper and a pencil." Hughston also won top honors at the 1968 International Science Fair in Detroit.

A.E.C. Appointment

Theos J. Thompson, Professor of Nuclear Engineering and Director of the M.I.T. Nuclear Reactor, has been nominated by President Nixon to be a member of the Atomic Energy Commission. With Senate approval he will complete a term to be left vacant by the resignation of Gerald F. Tape. The term expires in 1971.

Dr. Thompson is recognized as an expert in the field of nuclear research reactors. After spending three years at the Los Alamos Scientific Laboratory, he came to M.I.T. to direct the design and construction of the M.I.T. Reactor. He became the Reactor's director when it went into operation in 1958.

He holds degrees from the University of Nebraska and the University of California at Berkeley and received the A.E.C.'s Ernest O. Lawrence Award in 1964.

Visual Studies Fellows

Two new Fellows have been appointed to the M.I.T. Center for Advanced Visual Studies Gyorgy Kepes, Director, has announced.

Wen-Ying Tsai, Chinese-born mechanical engineering graduate of University of Michigan ('53) is an artist working in metal sculptures activated into stroboscopic light effects and harmonic motion. He had a one-man exhibition, "Cybernetic Sculpture," at the Howard Wise Gallery in New York last May. The second is Stan VanDerBeek, a New York-born experimental film-maker whose work has won wide recognition in Europe and North America. His computer-produced film, "Man and His World" was shown and won second prize at Montreal's Expo '67. It was also shown last December at the Museum of Modern Art in New York.

The two C.A.V.S. research fellowships are one-year appointments designed to enable these artists at M.I.T. to interact freely with scientists, engineers, and scholars of many disciplines. The Center already has two Fellows and two Graham Foundation Fellows.

M.I.T.'s "Badge of Honor"—an Institutional United Fund

"Judy is a high school sophomore struggling with geometry and paying a tutor with her own money. Is there someone in North Cambridge who can volunteer to tutor geometry?"

"Kim will graduate from high school if someone can become his friend, support his endeavors and encourage him to attend school regularly. Need critical."

Signs like these posted in M.I.T. corridors are a result of the M.I.T. Community Service Fund, a new Institute undertaking which its sponsors hope can become a model for other universities wishing to commit themselves to helping their urban environment.

Charles P. Kindleberger, Professor of Economics and Chairman of the Fund's Board of Trustees, calls it "an institutional version of the United Fund." Its purpose is to support and extend community service projects of M.I.T. students and staff.

In its first year the Fund collected—and dispersed—about $23,000. Now beginning its second year, the Fund is running a major campaign throughout the M.I.T. community with a $100,000 goal. The money will be used where it can "exert leverage," says Professor Kindleberger. "We don't want to spend money unless its use enables other, complementary actions to take place."

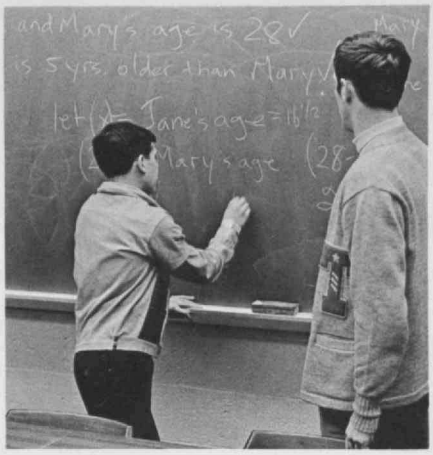
The organization of the Community Service Fund was a consequence of the number of M.I.T. students in operating volunteer work projects for less privileged residents of Cambridge and Boston (*See "I Have Seen It Happen" in* Technology Review *for July, 1968, pp. 61-63*).

"They Are Our Future Hope"

The list includes the M.I.T. Upward Bound Program for 75 youngsters in grades six through 11; Tutoring Plus, a tutoring-big brother program in Cambridge; group-work activities; a secretarial project in Cambridge; a high school studies program with Saturday classes at the Institute, tutoring in mathematics and remedial reading in the Roxbury section of Boston; mental hospital work; and an educational and cultural enrichment program in the South End of Boston. More than 1,000 students, faculty, and staff have participated in these activities since their founding. Several of these have benefited from modest Institute budgets.

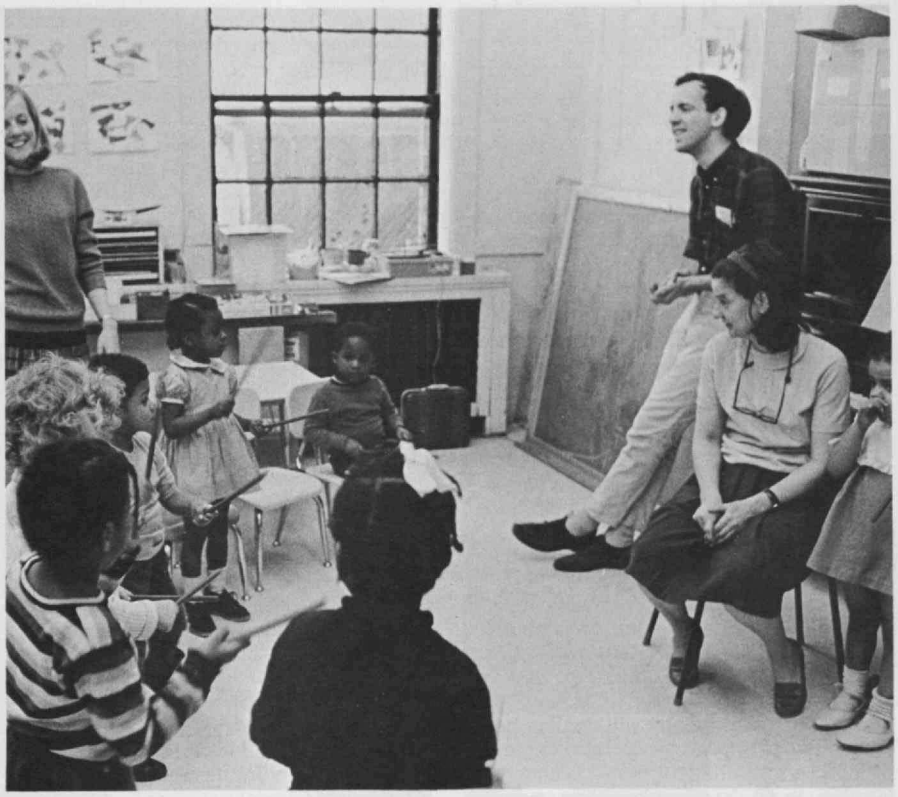
Increased support from the Community Service Fund will provide training for volunteers, many of whom are now carrying responsibilities far beyond their qualifications or experience. The Fund also proposes to develop and purchase educational materials; to provide for transportation and incidental expenses of volunteers; and to encourage local groups in the Greater Boston area to articulate their needs. The support funds should reach $150 per volunteer per year, according to Professor Kindleberger.

Gregory Smith, '30, who represents the Corporation on the Trustees of the Community Service Fund, told the Corporation at its March meeting that the work deserves support because "it is an honor to the school" and because, at the same time, "it is helping to ease some of today's tragedies." The students who are "united in this common effort," said Mr. Smith, "are a badge of honor to this school, and they are the young people who are our future hope."



A panorama of M.I.T. students' community services: high school studies in M.I.T. classrooms, cultural enrichment in Boston's South End, Upward Bound, and tutoring—family service projects. The M.I.T. community Service Fund promises a way for all members of the Institute family to help. (Photos: Dov Isaacs, '72)









Alumni News

Paths of Virtue for the Human Side of Industry

People are at the heart of the business enterprise. They always were, and they probably always will be.

There is nothing unique about a management conference that reaches these conclusions. But the 50 alumni and their guests who came to Columbia University's sumptuous Arden House for a three-day conference of the M.I.T. Alumni Center of New York in April felt no disappointment. Because in these days the impact of people upon the business enterprise is taking on some highly unconventional dimensions.

The seminar went to work quickly on Sunday evening, April 20, when Anthony J. Wiener, Chairman of the Research Management Council of the Hudson Institute, told the members that at some point—perhaps soon—in our economic growth ("a startling moment," he said) we will suddenly discover that we have solved the economic problem. At that moment we will become like today's idle rich: the value of money will decline because people will no longer feel needs which can be fulfilled by money and its purchasing power. "We will lack 'manipulative rationality'—the sense that hard work equates with high reward," said Dr. Wiener.

Already, said Dr. Wiener, our increasing affluence is affecting the constraints which people feel in making decisions, and this is leading to "a major change in our life style and sense of values." In general, said Dr. Wiener, history shows that as labor and jobs become less important in a society, alienation and meaninglessness increase. "Can we return to paths of virtue, despite the fact that money is worth less and is less wanted?" he asked.

Keeping Pace

A very different view of the power of the human factor came from John W. Kunstadter, '49, Director of Research and Development at Genesco, Inc., commenting on a report of potential new technological breakthroughs by Robert A. Alberty, Dean of the M.I.T. School of Science. Despite the immensely rapid pace of science, said Mr. Kunstadter, "the world is a pretty conservative place, and it may not be so different in 30 years as we now proclaim." The difficulty is that social and political attitudes cannot keep pace with science and engineering, so we cannot capitalize on the new powers which technology gives us. "The only thing that could change our situation," Mr. Kunstadter said, "is a revolutionary extension of education to people whose schooling is now thought to be finished."

E. Marshall Nuckols, Senior Vice President of Campbell Soup Company, brought the human issue more directly before management by talking about industry's social responsibility in terms of his own company's projects in its corporate home area of Camden, New Jersey. "Our most profitable corporations," Mr. Nuckols noted, "are those which have achieved social goals," but the rationale for business today goes "far beyond enlightened self-interest." While profitability remains the primary obligation, today's business must engage in "creative philanthropy" and must take responsibility for the social and physical environment in which it works. Indeed, Mr. Nuckols said, "the health of any business community is irrevokably linked to the health of society at large."

Systems Analysis and Decision-Making

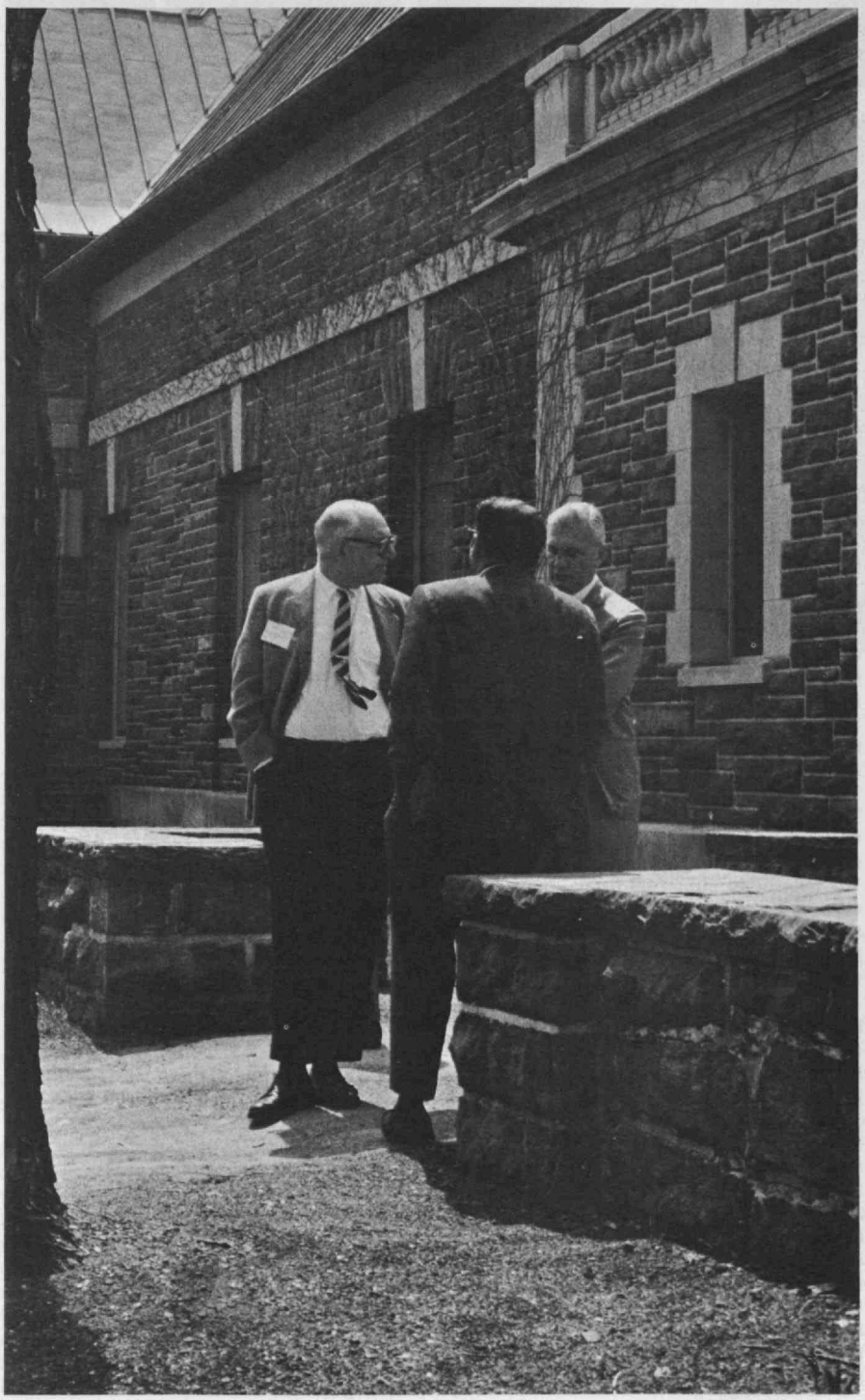
There was some difficulty for the human side of the equation when Arnold E. Amstutz, '58, Associate Professor of Management at M.I.T., spoke about corporate systems analysis. "As humans we are incapable of describing a system with more than a few orders of variables," said Professor Amstutz; so the job must be done by sophisticated computers. The result, he admitted, is a "strange style of management" which focusses on validating computer models of the business and its environment so that—in many cases—the computer can alone be trusted to make the correct decision.

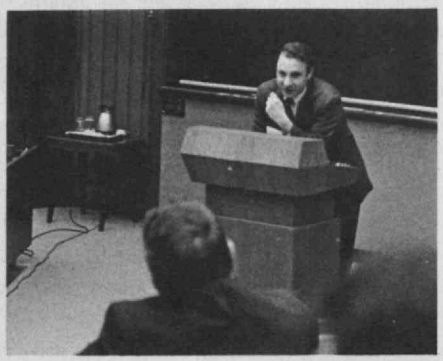
In this situation, said Donald C. Carroll, Ph.D. '65, M.I.T. Professor of Management, computers increase the amount of data which is available on which to base management decisions and affect "the logic and process by which the decision-maker 'does his thing.' It is now technically feasible to monitor the whole decision structure of an enterprise from one top executive's desk," said Professor Carroll. "But is it desirable to do so, from the organizational point of view?"

Finally, Mason Haire, Professor of Management at M.I.T., gave the seminar some reason to rejoice that the computer may in fact be ready for a decision-making role in the future. By 1975, he said, there will be an absolute decrease of about 1 million men in the age bracket 35 to 45—an 8 per cent deficit in the labor pool. But most companies are projecting continued growth of product and market in this period, and they are doing so without giving much thought to where their executive talent will come from. Indeed, said Professor Haire, in proposing some guidelines for company action, "very nearly no one is doing much planning about this problem. . . . Personnel management is still a long way from quantitative anaylsis."

The New York Center's seminar, titled "Strengthening Management for the Seventies," was arranged jointly by Daniel I. Cooper, '46, Vice President for Planning and Development of McGraw Hill, Inc., and Albert B. Van Rennes, '44, Technical Director of Bendix International.

Though Columbia University's remarkable Arden House conference center in Harriman, New York, provided an unforgettable background, it was people who came out the winners when the M.I.T. Alumni Center of New York sponsored a three-day management conference this spring.











Long Island Conference: Technology and Society

Six views of the issues facing man as he seeks to feed, clothe, and house his increasing numbers in the coming decades were features of the M.I.T. Eastern Conference in Garden City, Long Island, on March 15. More than 500 high school students from 58 Long Island high schools joined 250 alumni and other guests for the day-long program at the Garden City Hotel.

Dr. Nevin S. Scrimshaw, Head of the M.I.T. Department of Nutrition and Food Science, speaking to the conference on food resources for the world's increasing population, declared that conventional agricultural food sources will be insufficient; we must look to supplementary, unconventional sources of protein "produced through the application of science and technology," he said. One example, said Dr. Scrimshaw, may be single-cell organisms—yeasts and bacteria, for example—which multiply rapidly and so can be a source of plentiful and inexpensive protein. He described experiments in which a food yeast prepared at M.I.T. has been used by 80 M.I.T. student volunteers to fulfill their full protein requirement for more than two months without adverse gastrointestinal reactions.

And man will remain dependent upon such natural protein sources, at least for the predictable future; a synthesis of protein is not yet within the grasp of life scientists, Robert A. Alberty, Dean of the M.I.T. School of Science, told the conference. It is much more realistic, said Dean Alberty, to anticipate that the life sciences can contribute to alleviating human suffering through the control of genetic disease. But even these applications of our growing knowledge of genetic systems "are pretty far in the future," he said. We can only begin "to perceive their form, and they are of the greatest importance for mankind because they are concerned with the most fundamental stuff of living things."

James R. Killian, Jr., '26, Chairman of the M.I.T. Corporation, returned the conference discussion to the present. Referring to such advances as these proposed by Professor Scrimshaw and Dean Alberty, Dr. Killian emphasized that college students of today are impatient with the pace of science; they "idealistically seek a more perfect condition of liberty, peace, justice and brotherly love." And the nation's response to "these sincerely troubled young people," said Dr. Killian, "may well determine how successfully we can protect our society and its institutions from those who conspire to use terror, disruption and destruction to gain their revolutionary ends."

Other conference speakers included Patrick M. Hurley, Professor of Geology, who summarized growing knowledge of continental movements in the earth's history (*see page 55);* Robert C. Wood, Head of the M.I.T. Department of Political Science, on future urban development problems; and Robert W. Simpson, Sc.D. '64, Associate Professor of Aeronautics and Astronautics, on transportation problems.





Joseph G. Gavin, Jr., '41, Vice President of Grumman Aircraft Engineering Corporation (right, top), welcomed guests at the M.I.T. Eastern Conference in Garden City, Long Island, this spring; he is shown with James R. Killian, Jr., '26, Chairman of the M.I.T. Corporation, who was one of the principal Conference speakers. In the lower picture, Alfred C. Wu, '40, Chairman of the Conference (left), was photographed visiting with Dr. Nevin S. Scrimshaw, Head of the Department of Nutrition and Food Science, another conference speaker, and Anne Valrode of Manhasset High School, one of nearly 500 high school students who were guests of the M.I.T. Club of Long Island for the day. (Photos: Cliff De Bear from Newsday, *Long Island, and (bottom) Queens-Nassau picture from the* Long Island Press)

The conference was arranged by a committee of 15 Long-Island-area alumni under the chairmanship of Alfred C. Wu, '40. Nearly 40 industrial firms and individuals helped the M.I.T. Club of Long Island meet the expenses of inviting high school students and their teachers to the meeting.

In addition to Mr. Wu, conference committee members included Frederick R. Bentel, '51, Maria A. Bentel, '51, Stephen E. Eppner, '45, Walter P. Frey, '56, Henry Janes, '27, Harvey Karm, '42, Adrian G. Marcuse, '42, Bernard H. Nelson, '35, Christopher A. Rafferty, '35, R. Dixon Speas, '40, and Ned A. Spencer, '46. The Advisory Committee consisted of Irving D. Jakobson, '21, Chairman, Joseph G. Gavin, Jr., '41, E. Donald Gittens, '35, David B. Nichinson, '42, Lloyd St. Jean, '42, Arthur C. Sugden, '31, and Teddy F. Walkowicz, '41. Robert I. Kraus, '42, is President of the M.I.T. Club of Long Island.

M.I.T. Club of St. Louis: How to Keep Up with Ourselves

How mankind can help realize, in M.I.T. President Howard W. Johnson's words, "the immense opportunities in organized analysis—which is science—toward the solution of complex human problems" was the focus of attention for over 400 guests at the M.I.T. Midwest Conference in St. Louis on Saturday, April 12.

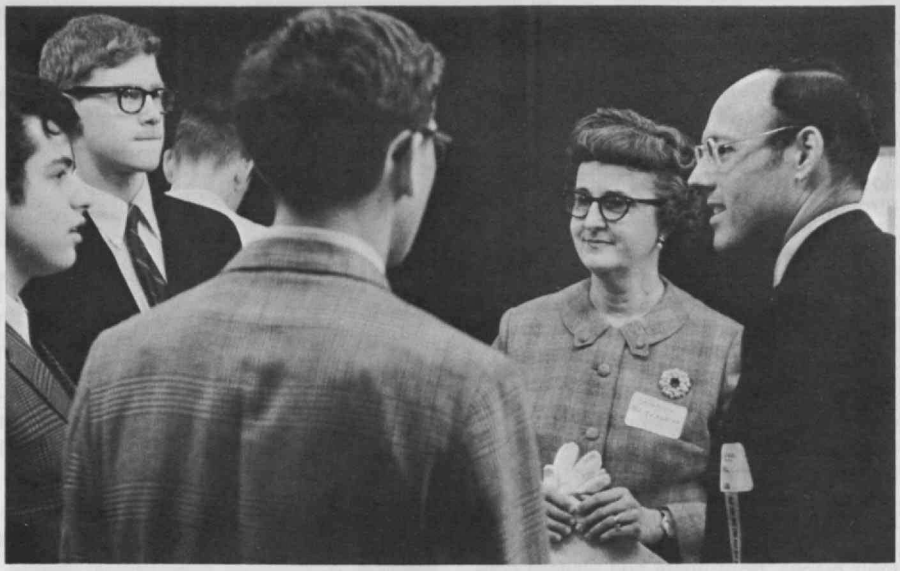
The Conference speakers carried this central theme through problems of food supply, pollution, medical science, aids for the handicapped and urban affairs. At the end President Johnson summarized the day's proceedings with the observation that "man's extraordinary achievements are permeated with a sense of uneasiness in coping with our own fast pace. We seem barely to be maintaining control of a rapidly moving vehicle," he said.

The other speakers provided examples:

Samuel A. Goldblith, '40, Professor of Food Science—To solve most of today's food problems in underdeveloped countries requires only the application of existing knowledge about food production and processing; but human habits and tastes, as well as poverty and economic incentives, stand in the way. Increasing world population in the future, said Professor Goldblith, will make necessary new technology for higher agricultural productivity, use of such unconventional food sources as single-cell proteins and synthetic foods, and the wider application of fundamental principles of engineering systems in the design of food processing equipment. But there may be ultimate limits to our food supplies. For instance, said Professor Goldblith, pollution of the environment by fertilizers may in fact put a ceiling on man's efforts to increase farm production. It is when such limits have been reached that population control will be an acceptable social response.

Raymond L. Bisplinghoff, Dean of the School of Engineering—The conventional posture of the engineer, is to overcome a natural problem so that man's life can be richer. But today man-made problems—rather than natural ones—are becoming a significant part of engineering practice. Indeed, said Professor Bisplinghoff, engineers must now set for their work a "standard of unobstrusiveness;" and if the work of an engineer does not in this sense "add to the value of civilized life, that work should be stopped."

Irwin W. Sizer, Dean of the Graduate School—Our growing knowledge of fundamental life processes is yielding immense benefits for humans. "We are well on the way to understanding and curing human cancer," and we have made "very remarkable progress" in treating mental disease. Can similar achievements bring our growing fundamental knowledge to such urgent problems as population control and eugenics





Paul A. Lux, '52 (right, top picture), welcomed high school students and teachers to the M.I.T. Midwest Conference in St. Louis this spring, while Howard W. Johnson, President of M.I.T., visited with alumni who travelled from throughout the midwest to attend the day-long event.

—and are we prepared to understand and deal with the consequences?

Robert W. Mann, '50, Professor of Mechanical Engineering— Bioengineering, the intersection of the physical and engineering sciences with the medical sciences, represents a new area of human achievement. One example is the application of engineering knowledge to the design of aids for physically handicapped people. Here the problem is often to understand "the true nature of the deprivation" before attempting an engineering application to resolve it.

John F. Collins, Professor of Urban Affairs—There is new hope that our urban problems can be alleviated by the use of our expanding technological knowledge, and in this the university must have a central role. But no academic community is yet "really able to deal with these problems." Intuition and "patchwork solutions" are clearly inadequate. The need is for research on new methods of analysis and innovative ideas to prevent us from "iterating and reiterating the errors of the past." One example is the recent work by Jay W. Forrester, Professor of Management at M.I.T., on a systems analysis of urban problems (*see* Technology Review *for April, pp. 21-31*).

More than 200 alumni and their wives attended the conference, and an equal number of high school students from the Greater St. Louis area were guests of the M.I.T. Club of St. Louis for the day.

Ellis C. Littman, '33, as General Chairman of the Conference, was assisted by a committee including Merlin E. Lickhalter, '56, Vice Chairman, Norman B. Champ, Jr., '50, Edward Edgerly, Jr., '54, Robert W. Hanpeter, '48, Stanley K. Landgraf, '47, Ronald H. Lieber, '55, Paul A. Lux, '52, James Maguire, '38, James C. McAllister, '50, Robert L. Slifer, '50, and Wesley W. Wedemeyer, '30.

"That's It—Communication!"

M.I.T. is changing so quickly and in so many ways that even those who live and work there may be caught in the turbulence of misunderstanding. Far more likely that alumni fail to understand, said Howard L. Siegel, '71, and W. Samuel Stroud, '70, in their prospectus for the 1969 Alumni-Student Weekend.

To bring the two generations together, some 40 alumni were hosted by as many M.I.T. undergraduates on April 18 and 19 for a kind of "house party" week-end. The alumni visitors stayed in dormitories and fraternity houses, and they joined with students in discussions aimed at giving them a better understanding of academic and student affairs.

In the end a good many stereotypes were disposed of—and few new ones took their places. Both hosts and visitors concluded that in an era of rapid change, everyone's problem is "to learn to operate under unstable conditions and deal with problems not easily defined," as Howard W. Johnson, President of M.I.T., told the group on Saturday morning.

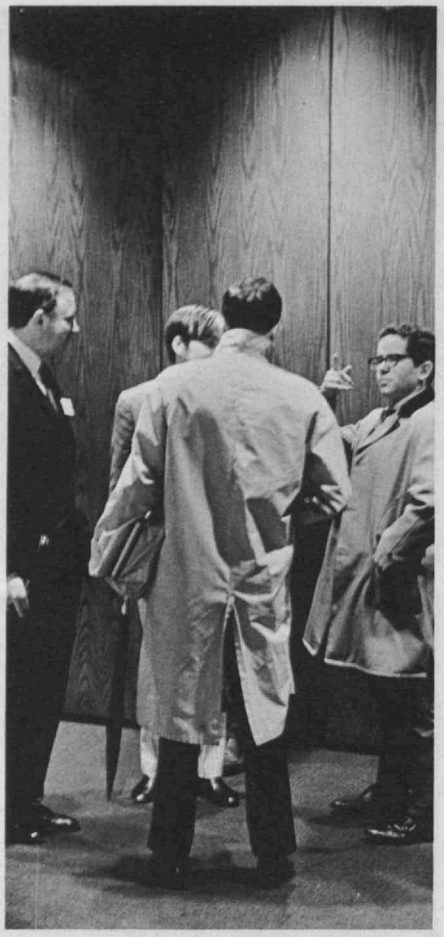
Given this situation of life with ambiguity, said President Johnson, and given the mutual understanding of objectives and the will of students and faculty to work together toward them, M.I.T. can continue to develop "a unique pattern and purpose for education in this country."

Four members of the faculty later spoke more specifically of how M.I.T. is changing in response to new demands upon professional graduates and the changing character of students entering the Institute.

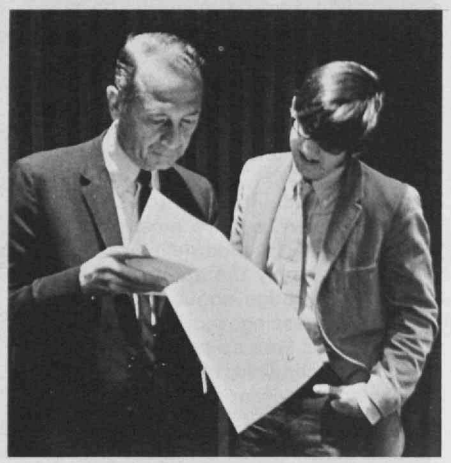
For some, said William Speer, Associate Dean of Student Affairs, the Institute's first lesson for a student is "conscious selective negligence," because the demands are so great that few students can master them all. But this is not an inappropriate lesson, he insisted.

The experimental "pass-fail" grading system currently in use for all freshmen was explained by Everett E. Hagen, Professor of Economics, in these terms: Today's M.I.T. student can define his purposes in coming to the Institute in a very mature way. So the incentive of grades is no longer appropriate; "grades are not really the name of the game," said Professor Hagen. After one term of the experiment, he said, there are indications of advantages: students are not forced to "suppress their interests or curiosity" because they must study for a quiz; and motivation becomes genuine, not artificial. But there are at least some students who are "uneasy in the absence of quantitative measures of progress," he admitted.

Professors Anthony P. French and Ascher H. Shapiro, '38, respectively of the Departments of Physics and Mechanical Engineering, spoke of the increasing









W. Samuel Stroud, '70, opened the 1969 Alumni-Student Weekend (top, right), and Professors Shapiro, Speer, Rosenblith, French, and Hagen (left to right, above) conducted a panel discussion on the changing undergraduate curriculum.

flexibility in M.I.T. curricula. As the diversity of student interests increases, it is less and less possible to prescribe an educational program appropriate for all, said Professor French. So the faculty's effort is to provide for students who wish to depart from norms, "to accommodate to students who can help M.I.T. become an ever more important contributor to the whole country's progress."

Professor Shapiro admitted that the success of the engineering profession in the past has been based almost solely upon technical capability. Now, he said, we are preparing students for engineering careers which include responsibilities not only to perform engineering but to evaluate it.

Black Student Union, Community Service

Later in the day, students and their guests gathered for seminars on ares of student interest. Members of the M.I.T. Black Student Union described their experiences in a dozen cities last fall to visiting high schools on behalf of the M.I.T. Admissions Office.

Another group of alumni and students discussed the efforts of fraternities to continue their traditional extracurricular role in undergraduate education. Two seminars explored work involving nearly 500 M.I.T. students in projects such as Tutoring Plus, the Roxbury Tutorial, M.I.T. Outward Bound, and *La Opportunidad* under the M.I.T. Social Service Committee.

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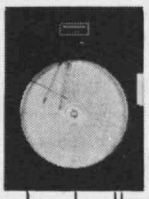
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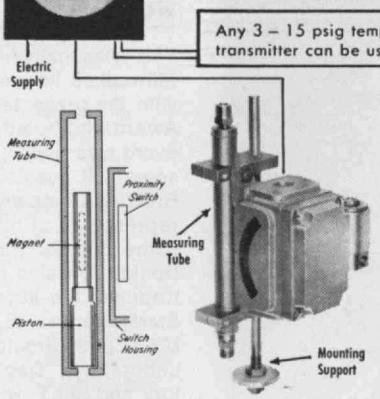
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STEVE HAWKINS '57





Members of the Washington Wellesley Club and the M.I.T. Club of Washington at a joint lecture American Socialism and Soviet Capitalism. *In the photo above left, Ronald E. Daniels has an animated discussion with Professor Charles Kindelberger of M.I.T., who spoke of a trend toward socialism within the U.S. E. Alfred Picardi, '44, listens in. In the photo above right are Mrs. Douglas Rigler, President of the Washington Wellesley Club and Professor Marshall I. Goldman of Wellesley, who spoke on current capitalistic trends within the Soviet Union.*

Sloan School Programs

A lively program of activities for graduate alumni of the Sloan School of Management has been laid out in a series of spring meetings of the national officers of the Graduate Alumni Association of the (GASSM) under the leadership of Arthur P. Alexander, S.M.'58. The schedule includes a cocktail party at M.I.T. on June 15, two meetings at the Sloan School of Management in 1968-69 (the first one tentatively scheduled for October 8), and at least one meeting during the same period in New York.

In addition, there will be one or more newsletters, monthly "soup and sandwich" lunches in Boston as well, perhaps, as in other large cities, and a national election of officers (in July, 1969). Suggestions and comments will be welcomed by Richard J. Wollensak, S.M.'58, at Itek Corporation, 10 Maguire Road, Lexington, Mass., 20173.

Bold Dreams

The Wisconsin Air Force Association of Milwaukee honored Captain James Lovell with the presentation of the Billy Mitchell Award on Thursday, March 20, 1969. The event was highlighted by a dinner with some 300 guests hosted by the Schlitz Brewing Company. M.I.T. was well represented at this affair. B. Paul Blasingame '50, General Manager of AC Electronics, Division of General Motors, introduced the keynote speaker Dr. C. Stark Draper, '26, Institute Professor of M.I.T. and Director of the Instrumentation Laboratory. "Doc" Draper, the Laboratory and M.I.T. were given due recognition for their heavy contribution to the success of the Apollo mission. Dr. Draper talked of a "bold dream" and "grand design" that stretched available technology to make it work. He expressed the fear, however, that today perhaps we "have too much security and not enough bold dreams."

M.I.T. Club of Fairfield County

Georgy Kepes, well-known artist and Professor of Visual Design, M.I.T.. Department of Architecture, lectured at a combined dinner meeting of the M.I.T. Club of Fairfield County, The Wellesley club of Southwestern Fairfield County and the Wellesley Fairfield Villages Club. The dinner, held May 21, at the Shorehaven Golf Club, was open to all M.I.T. and Wellesley Alumni, their spouses and guests.

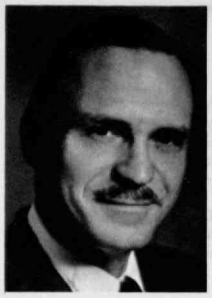
Widely known as an artist, city planner and author, Professor Kepes studied at the Academy of Fine Arts in Budapest and become a prominent member of the *avant garde*. In 1930 he gave up painting for film work joining L. Moholy Nagy in Berlin to work on film, stage and exhibition graphic designs; in 1937, he came to the United States to head the Light and Color Department of the Institute of Design in Chicago.

Upon joining the M.I.T. faculty in 1946, Professor Kepes became interested in the convergence of art and science. His creative interests have been wide-ranging. He is the author of several art books, one of which, *The Lew Landscape in Art and Science,* compares forms in nature and in works of art. At the new M.I.T. Center for Advanced Visual Arts, of which he is Director, he gives special attention to the creative use of light. He executed the mobile light mural of the New York City K.L.M. office and has designed 140 feet high stained-glass windows to be installed in the San Francisco cathedral designed by architect Pietro Belluschi.

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Governor Ferré, '24 Governor Sargent, '39

Alumni Day—June 16

"The Human Purpose" will be the theme of the annual Alumni Day reunion at M.I.T. on June 16. With special events for the reunion classes, guest speakers Luis A. Ferré, '24, Governor of Puerto Rico and member of the M.I.T. Corporation, and Francis W. Sargent, '39, Governor of Massachusetts, as well as hearty intellectual fare for the morning and afternoon sessions, this year's Alumni Day promises to be both purposeful and human.

Technology in art, radio astronomy, Apollo, environmental values in highway design, computers in complex social systems, and waste disposal will be among the morning topics to be presented by members of the M.I.T. faculty. The afternoon is scheduled for the two governors and other speakers, followed by the traditional Social Hour on the Briggs Field Mall.

James R. Killian, Jr., '26, Howard W. Johnson, President of M.I.T., John F. Collins, Professor of Urban Affairs, Jay W. Forrester, E.E.'45, Professor of Management, Gyorgy Kepes, Professor of Visual Design, Alfred H. Keil, Head of the Department of Naval Architecture and Marine Engineering, Steven R. Tannenbaum, '58, Assistant Professor of Food Science, and David G. Wilson, Associate Professor of Mechanical Engineering, are among the speakers.

A special exhibit of African sculpture from the collection of Paul Tishman, '24, will be on view in the Hayden Gallery and there will also be luncheon, a special buffet, dinner, and dancing.

Alumni Calendar

San Francisco—Wednesday, June 18, 6:30 p.m.—Dinner Meeting, University Club. Speaker: Professor Walter A. Rosenblith, Chairman of the M.I.T. Faculty.

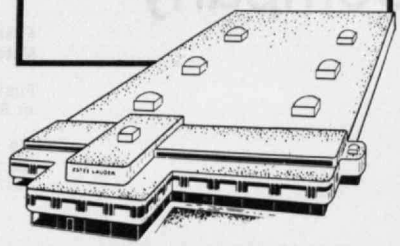
Seattle—Thursday, June 5—Speaker: Paul E. Gray, '54, Assistant Provost, M.I.T. Topic: The Changing University.

Class Reunions—June 14-15, 1969

Deceased

David C. Churchill, '99, January 4
Alfred W. Lombard, '99, March 1
Charles I. Auer, '01, February 12
Charles W. Kellogg, '02, March 31*
William A. Howell, '03, January 21
Clyde Mac Cornack, '03, October 23
Fred H. Abbott, '05, March 19*
Augustus Hayward Kelley, '06, December 31, 1968*
Patrick J. Kennedy, Jr., '06, March 14
Philip B. Walker, '07, May 1*
Carroll D. Steele, '08, February 3
Henry C. Turner, '09, January 19
Allen Curtis, '10, September 12, 1968
Spencer B. Lane, '10, February 9, 1969
Herbert G. Reynolds, '10, March 8*
Walton G. Harrington, '10, March 5*
Norman S. De Forest, '11, December 5
Robert G. Daggett, '13, March 3
Earle N. Frank, '14, March 18
John A. Root, '14, March 10
Thomas Pond, '15, November 24, 1968
William Edwin Long, '16, January 8
Archibald G. McLay, '16, December 25
L. S. Wright, '16, December 18, 1968
William Warren Rausch, '17, December 9, 1968*
Ernest M. Pace, Jr., '17, March 6*
Willard E. Bonnell, '17, November 2*
Thorndike Saville, '17, February 24
Chester C. Beach, '18, November, 1968
H. Loring Wirt, '18, March 5
Elmer P. Grismer, '20, March 6*
Erskine D. Lord, '20, February 9
George Sergei Piroumoff, '21, April 3*
Herbert V. Thaden, '21, February 8
John F. Halpin, '22, March 1*
Joel D. Harvey, '22, April 9
Marvin Eickenroht, '23, February 22
Joseph C. Nowell, Jr., '23, March 18
George H. Southard, 3d, '23, December 28, 1968
Shepard S. Weinbaum, '23, February 1
Harold G. Donovan, '24, March 9*
Thomas E. Fitzgerald, '24, March 17*
Donald B. Mason, '24, February 20*
Donald W. McCready, '24, October 15, 1967*
Lewis M. Van Gieson, '25, January 18
Frank A. Wilkinson, '26, February 1
Harry D. Hoffman, 27, March 6, 1963
Edmund I. Woodbury, '28, September 22
William G. Loomis, '28, November 11
Ford W. Sammis, '28, February, 1969
Jordan Minichiello, '30, January 28
Lincoln S. Gifford, '31, March 14
Philip R. Mayo, '32, March 11*
Walter Oppen, '33, October 20, 1968*
Joseph Awramik, Jr., '34, August 18, 1968
Morgan Rulon, '36, December 29, 1968
Thomas J. Kieley, '37, December 25, 1968
Burton D. Aaronson, '38, September 27, 1968
Seymour Gross, '38, February 10
Alva L. Herman, '39, January 20
Robert S. Thompson, '41, February 21
Svante Mellgren, '47, January 9
George J. Maritz, '48, 1967
John H. Wright, '48, December 7, 1967
David I. Cooper, '53, August, 1964
Joseph D. Mooney, '65, March 22
*For further information see Class Review

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1301 E. Morehead Street
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704/375-1735

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Engineers

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Mechanical-Electrical-Sanitary
Elevator and Materials Handling

John F. Hennessy '24,
John F. Hennessy, Jr. '51

144 East 39 Street
New York, New York
10016

1720 Eye Street, N.W.
Washington, D. C.
20006

Kane on M.I.T.

TECH TALK ads

A few chosen, not entirely at random, from the Institute's biweekly publication for internal communication.

BECAUSE SPACE is at a premium, abbreviations are used generously. Some are readily decipherable, as in this description of a car:



•p st & br, ww's, AM-FMR, snows, yellow w/blint, A-1 cond, best offer

❀ ✱ ❀

OTHERS, however, require specialized knowledge ~ or a vivid imagination:



•Sm old enlarger, gd for beginner. $15
•Bk Bay, Bcn St, furn sum sublet, fpLR, BR, k'ette, B. Call María

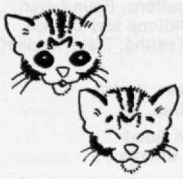
EASY? OK, how do you score on this?



•ACM J/Comm, Comp Rev, 1/63~12/68, best offer. Lv mes for Joe

❀ ✱ ❀

EVERY ISSUE is guaranteed to contain a few ads of this sort:



•Free: 3 handsome tiger kittens, 1 bob-tail, 1 dbl paws
•Homes for cuddly kittens Noah and Abraham. Call Valerie



•Sealpt Siamese m kittens, 6 wks, affec, trained, all shots, $25

❀ ✱ ❀

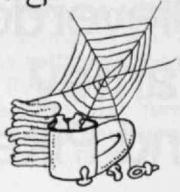
AND SOMEONE is always losing the thrill of carefree cycling:



•Honda '68, 90 cc, 1200 mls, best offer over $200. Mary

THE PAGE has a certain historical significance, a record of the passage of time:

•Child's seat for back of adult's bike; sm bike w/trn wheels.
•Two seater (not twin) stroller.
•Backpack infant seat, $8: changing tbl, $15: sled, $4.



❀ ✱ ❀

SOMETIMES a real bargain shows up:



•TV, broken pic tube, but gd cond otherwise. $2.
•Carton photos of famous opera stars, free. Call Ginny.

❀ ✱ ❀

ON OCCASION there is a surprise natural history item:



•Woolly monkey, 9 mos old, v affec. Joe Smith

❀ ✱ ❀

And then, the WANTED section:



Information on striper fishing.



We give info on au pair girls.



Resp couple to house sit, care for pets in Lex, July. Call Mrs.....

❀ ✱ ❀

TECH TALK ads, an Institute institution.

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Brewer Engineering Laboratories Inc.

Consulting Engineers

Experimental Stress Analysis, Theoretical Stress Analysis, Vibration Testing and Analysis, Specialized Electro-Mechanical Load Cells and Systems, Structural Model Testing and Fabrication, Strain Gage Conditioning and Monitoring Equipment.

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Marion, Massachusetts 02738
(617) 748-0103

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Consulting Civil Engineers

Robert E. Smith '41, President

Dillsburg, Pennsylvania, USA

Cleverdon, Varney and Pike

Consulting Engineers

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112 Shawmut Ave.
Boston, Massachusetts
02118

Charles Nelson Debes Associates, Inc.

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C.N. Debes '35

915 East State Street
Rockford, Illinois

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W.J. Hamburger '21
E.R. Kaswell '39, K.R. Fox '40,
M.M. Platt '42
G.A.M. Butterworth '61

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Dedham, Massachusetts

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Engineers

Boston, Massachusetts

Jackson & Moreland

Engineers and Consultants

Division of United Engineers & Constructors, Inc.

Boston, Massachusetts

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31 St. James Avenue
Boston, Mass. 02116
Telephone: 617-542-2640

Metcalf & Eddy, Inc. Engineers

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Urban Renewal

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Philip C. Rutledge '33

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New York, New York 10017

Maurice A. Reidy Engineers

Foundations and Soil Mechanics

Structural Designs, Buildings, Bridges

101 Tremont Street
Boston, Massachusetts 02108

Soil Testing Services, Inc.

Consulting Soil and Foundation Engineers

Site Investigations, Foundation Recommendations and Design, Laboratory Testing, Field Inspection and Control

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Sylvio J. Pollici '56

111 Pfingsten Road
Northbrook, Illinois

Technology International Corporation

Applied Science
and Technology

W. P. Boquist '54

Boston and Bedford
Massachusetts
Telephone: (617) 275-8424
Cable Address: INTECH

Class Review

of note

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Feeding and care of astronauts
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Political Economics '49

Mechanical engineering grad becomes youngest Chief of Surgery '51

1968 Alfred Nobel Prize '62

100th heart donor '68

Copy for this issue of *Technology Review* was due from your Secretary about April 10. Information reaching him after that date will be reported in the July/August issue unless he desires to insert it in the Late News column which now appears on the last page of the Class Review whenever late news is reported.

95

Telephone conversation with *Luther Conant* on April 8th revealed he is holding his own, although still confined to his room in the Nursing Home. As for me, I am glad the snow has disappeared, permitting me to get out for lunch and a a walk. Waiting until the weather becomes warm enough to allow me to sit outdoors and watch Nature perform her wonders!

I am looking forward to going to Phi Beta Epsilon Fraternity House this week to visit with the boys. Christopher Brooks, one of the actives, wrote me a most cordial letter.—*Andrew D. Fuller,* Secretary, 1284 Beacon St., Brookline, Mass. 02146

96

In the city of Brockton a few miles south of Boston, a new museum was recently opened. It is to be known as the Brockton Art Center—Fuller Memorial and is the gift to his native city of classmate *Myron Fuller* who died in 1960. Before his death, Mr. Fuller had already established trust funds which were to accumulate until the principal reached one million dollars. At that time, 1965, the trustees decided that an Art center would be of great value to the community and started planning the building which was opened in January. The opening exhibit depicted three centuries of art in New England and contained material loaned by over a score of museums in the six state region.

If any of you come to Boston, you might enjoy visiting this very modern building which incorporates the traditional architecture of early times with the latest materials. The location itself is unusual as the building is on the edge of a pond and large windows in the corridors look out on it and on a small stream and lagoon. Inspired by Mr. Fuller's generosity, other civic minded citizens cooperated in donating the land which is adjacent to a city park. The museum hopes to have a permanent exhibit concerning Myron Fuller's life and activities. Although the directors are familiar with his work with the Sun Oil Company and the U.S. Geologic Survey they have little of more personal material because of the time lapse between his death and the foundation of the museum. If any classmate does have any information which might be of interest in setting up this display, the director, Edouard Du Buron, would be pleased to hear from you.—*Clare Driscoll,* Acting Secretary, 11 Cliff St., Plymouth, Mass. 02360

98

This is the month for all to enjoy the out-of-doors. *Alvan Davis* in Waterbury, Conn., and *Joe Riley* in Needham, Mass., can get out in the yards of their comfortable homes where they live alone; *Lyman Hewins* has only his bird "Cookie" on his houseboat in Maryland; *Mrs. Mabel Forrest Lambert* in Lowell, Mass., loves to watch the birds and the flowers in her garden which is not as large as it used to be. She lives with her daughter, as does *George Newbury* in N. Carolina.

We wonder if *Willard Nelson* in New York state will get his boat out soon? *Bob Lacy* in Baltimore, is getting ready to return to beautiful Squirrel Island for the summer. He wrote recently that the previous "summer was very pleasant with 19 small parties (3 to 8) on the porch, besides trips to Pemaquid for lobster, liquids and song. Fall and winter different with Flu and Grippe, leaving me still extremely sluggish. When I saw your picture on page 118 in the December, 1968, *Review,* I was thrilled to see the Yukon which we saw in 1939—30 miles north of Fairbanks. A road house there had a pack of young dogs which had unwisely attacked a porcupine. So with nippers I pulled many a quill out of mouth and tongue."

He has a fine way with animals as we noted in 1967 when we saw him with his dog, "Jim."—*Mrs. Audrey Jones Jones,* Acting Secretary, 232 Fountain St., Springfield, Mass. 01108

00

"For Class Notes—Class of 1900, from *Charles E. Smith* '00. Refugee from '99.

"I was attracted by the reference to my old friend and teacher Professor George F. Swain in a portion of the notes of 1903 in the April number of *Technology Review*, specifically the first paragraph following the subhead **Succeeded anyway** and relating the experience of Chas. L. Bates '03, with Professor George F. Swain.

"The Swain he described was not the Swain I knew and corresponded with in the year to which Bates refers. The fact that Swain was so determined that he take a particular job on the most important railroad shows that he believed Bates was destined for high places. Apparently Swain did not believe that hay fever was a deterrent. My '99 classmate S. B. Robertson was sent by Swain to the Pennsylvania R. R. at Pittsburgh, became General Manager and, if my memory serves me correctly, was weaned away from that job by being elected President of the world wide Tire and Rubber Co., at Akron, Ohio. Great success has rewarded Swain's protegés. I would not like Bates' picture of him to prevail without a counterbalance. Professor Swain made a practice of following the career of his students and recommending them for higher places when he thought they were not progressing adequately. In fact I believe great success has been achieved by those men recommended by all M.I.T. professors and by the placement directors through the years. Presidents of countless large companies were M.I.T. graduates.

"The esteem in which Tech graduates were then held is illustrated by the reply of an employment agency to an employer seeking a man of rather rigid technical skills. The employer was advised: "We are having trouble finding the man you want. If we fail will you accept two Harvard men or an M.I.T. graduate working half-time?"

"During the summer months of 1897 at the end of my Sophomore year Professor Burton arranged a job for me with the New England Railroad during which I wallowed around in the mud at Summer Street and Atlantic Ave., setting stakes for piling for the foundation of the South Station and other equally exciting jobs. At the end of my junior year—the third year was known as the hardest at Boston Tech—I flunked every course and thought my college career was at an end. Working my way through Tech, I suffered from malnutrition and was broke financially. However, Professor Burton (a great humanist and later Dean of Students) again arranged a job for F. C. Wardell and me with Huber D. Card M.I.T., '92, who was then City Engineer of Putnam and Willimantic, Conn.

"I was hardly settled in my new job when I received a handwritten cryptic note from Professor Swain, then head of the Department of Civil and Sanitary Engineering, reading as follows: 'Smith: You failed because you were tired and worn out. Don't open a book all summer, get plenty of fresh air, exercise, good food and sleep. Come back in September. You will pass your conditional exams. Geo. F. Swain.'

"I returned in September, passed all the examinations and was accepted for my senior year, but I dropped out for one year to recoup my finances and health, returning to my job in Connecticut. Wardell returned in September and graduated with 1899. In September 1899, I returned to Tech and graduated in June 1900, then returning to my former job in Connecticut. In September 1900 I received another hand-written note from Swain, reading: 'Smith: I have sent your name to the Bridge Engineer of the New York, New Haven and Hartford Railroad. When he offers you a job accept it. Willimantic is not going to grow. You are. Geo. F. Swain.'

"This statement was widely quoted in the press in publicity attending my appointments in later years as Bridge Engineer and Chief Engineer of the Missouri Pacific R. R., Consulting Engineer for the Cities of St. Louis, New York and other large cities, railroads and industries and on my appointment as Vice President of the New York, New Haven and Hartford Railroad Company.

"But Swain was not through with me. In 1903, the Naval Academy at Annapolis was not turning out enough Civil Engineers for its Bureau of Yards and Docks. The Navy appealed to several technical colleges for the names of Civil Engineer graduates with three years experience in structural design who would be interested in taking an examination leading to a Commission. Swain gave the names of Cooke, Smith and Thurber, Course I, M.I.T. 1900. Cooke had been working for the Navy at Portsmouth, N.H. since graduation. Thurber had been working for the Navy since graduation at League Island, Philadelphia. I had been three years with the railroad. Examinations lasted a whole week at Brooklyn Navy Yard in November 1903. Eleven others took the exams, fourteen men in all. Only four passed in this order: 1-Cooke, 2-Smith, 3-Thurber, 4-another whose name has escaped me.

"Cooke and Thurber were commissioned Lieutenants, Junior Grade, made their careers with the Navy and retired as Captains. I was disqualified because my teeth and eyes did not meet Navy standards. The fact that three 1900 Tech men led the field created quite a stir in the Department of Civil and Sanitary Engineering and elicited letters of congratulation from Professor Swain. (Fifteen years later during World War I, I was commissioned Major, Construction Division, U.S. Army, the previous exceptions of the Navy being waived. After getting settled in this position, I was offered a commission in the Navy, Civil Engineer Corps as Lieutenant Commander, the 1903 exceptions being waived. I wanted to accept this but the Army would not release me.)

"After the examinations at Brooklyn in 1903 I returned to railroad work, followed by my own business as Consulting Engineer at St. Louis, until I was appointed January 1, 1928, Vice President of the New York, New Haven and Hartford Railroad to assist the President. I had other contacts with Swain over the years. The first call I made on returning from the West was on Professor Swain to thank him for his help through the years. He had retired and was bed-ridden in his home in Brookline. He took both my hands in his arthritic hands and said: 'My boy, my boy, I knew you would make it.'

"This was the Swain I knew from my freshman year 1895-1896 until shortly before his death. He exerted a profound influence on the careers of his students. I feel sorry that Bates' unfortunate reaction to his experience with Swain affected him so adversely that: "So, I never got a job through M.I.T. after graduation and have never given them as a reference when applying for work." Few of us could afford to be so independent. With a little push from Swain and adroit mention of his M.I.T. background, he might well have followed one of his bosses, my old friend, dear old hardboiled J. G. Sullivan as Chief Engineer of the Canadian Pacific R. R. and who knows—possibly President of that Railroad. He had the training and experience that qualified him for those exalted positions.

"I have learned over a period of 69 years that when people learn for the first time that I came from M.I.T. their attention suddenly livens and some say, "Oh, M.I.T., that's a school to be proud of." Their reactions have been amusing, exciting, and profitable. I am certain that my M.I.T. background played a leading part in my progress to Chief Engineer of one great railroad and Vice President of another."

02

The following clipping from the *Queen Anne Record Observer* has been received from Grant Taylor: "*Charles Wetmore Kellogg,* 89, electric utilities head and prominent churchman died Monday evening (March 31) at the Memorial Hospital in Easton. The former president of the Edison Institute in New York City, Mr. Kellogg had lived with his wife at Langshaws just south of Wye Mills since 1939. Born in Philadelphia February 27, 1880, his lifetime spanned the development of the electrical industry from Edison's first power station in 1879 to the use of nuclear power. During World War II, Mr. Kellogg was appointed as chief consultant for national defense in the Light, Heat & Power Unit of the Office of Production Management. After receiving his bachelor's and Master's degree from M.I.T., he managed the El Paso Electric Co. and Eastern Texas Electric Co. Subsequently he was director of the Mid-Western District, manager of the Missisippi River Power Co. and Pres. of the Engineers Public Service



George Kershaw, '03, whose biography appeared on page 102 of the May Review.



Mr. and Mrs. George H. Garcelin, '03, and sons (see story below).

Co. of New York City during which time he supervised the construction of the Conowingo Dam in Maryland.

"After retirement from the Edison Institute in 1939 he moved to the Eastern Shore but remained active in utilities as director the the Virginia Electric & Power Co. in Richmond until his death. He also served on the board of the Equitable Life Assurance Society and as trustee of Teachers College in New York. He promoted the work of the Maryland Historical Society and the Agricultural Society of the Eastern Shore. Mr. Kellogg served the Episcopal Church in many capacities. He was deputy to the General Convention several times and was licensed lay reader and vestryman for Old Wye Church, Wye Mills for 20 years. As a member of the standing committee of the Diocese of Maryland Mr. Kellogg set up the Endowment Fund of the Diocese and was Treasurer of the Diocese Building Fund and the Diocese Loan Revolving Fund. Besides his wife, the former Clara Howard Davis he is survived by a son, Howard, of Philadelphia; two daughters. Mrs. Hale Corbin, Guernsey, England; Mrs. Robert C. Lea, Jr., Wayne, Pa., and a sister, Miss Edith Kellogg, Tyron, N.C. Thirteen grandchildren and six great grandchildren are living." Burial was in the Wye Church cemetery.

As class treasurer I would report that in January, after consultation with Bill Kellogg who was our class president, I withdrew the money in the class treasury —$146.03—which was in a savings bank account and turned it over to the Alumni Fund. I have received an appreciative letter of thanks.—*Burton G. Philbrick,* Secretary, 18 Ocean Ave., Salem, Mass. 01970

03

Your Class Secretary has again received a happy response to his earnest plea for more class biographies which enliven our class news in succeeding *Reviews.*

George H. Garcelin, Course VI, of 52 Farmington Ave., Longmeadow, Mass., has most patiently portrayed his busy and successful career since leaving the opulent presence of Proxies *Charlie Cross* and *Gaetano Lanza.* He modestly prefaces his past duties with the familiar slogan of reluctant classmates—"I consider my life work as very ordinary and not unusual to the engineering profession."

Three distinguished sons

However, George entered M.I.T. after graduating from the Somerville, Latin High School, joining our 1903 group of 435 classmates. After graduation from M.I.T. in Course VI, he went to East Pittsburgh, Pa., with the Westinghouse Electric Corp., on what is now know as the Graduate Student Course. About a year later, he was transferred to the engineering department in design and application of induction motors of various types. In due time, he was made manager of the Small Motor Engineering Department and when the equipment was transferred to the east Springfield, Mass., works he continued as Manager.

After four years there, he returned to East Pittsburgh, Pa., as manager of the Industrial Control Division. Here he continued until his retirement in 1948. However, he was recalled on special assignment for some years as Representative of Westinghouse to the National Electrical Manufacturer's Association for engineering standardization of fractional horsepower motors and industrial control equipment. For the ensuing 13 years he was chairman of the General Engineer Committee, Industrial Control Section, H.E.M.A.

Accordingly, after 45 strenuous years, he at last decided on a more restful period, so chose to retire and make his home at Longmeadow, Mass., which he had left seventeen years ago. George was married to Frances M. Borel of Wilkes Barre, Pa., on September 16, 1909, so eagerly awaits the joyful celebration of their 60th anniversary before long.

They are blessed with three distinguished sons. George F. is M.I.T. '33 and Director of Research and Development for Acthouse Chemical Co., of Reading Pa., a subsidiary of Compton & Knowles, Worcester, Mass. Fred H. is administrative Vice President of Standard-Thompson Corp., of Waltham, Mass. He was a graduate of Wharton School of Business Administration, University of Pennsylvania, 1936. Robert B. also a graduate of Wharton School, 1939, is now located in Santiago, Chile. He is Assistant Vice President of Chile Exploration Co., and Andes Copper Mining Co., subsidiary of Anaconda Co. All George's sons are happily married and have devoted children that visit his home frequently. In conclusion, there are seven grandchildren and two great grandchildren. Our classmates rejoice at George's successful career.

Clyde MacCornack, Course I, of 15th and Chestnut St. Philadelphia, Pa. is reported deceased as of October 23, 1968.

George B. Bradshaw, Course X, President, Valcan Chemical Co., 919-13th St. N., Birmingham, Ala., a new address.—*John J. A. Nolan,* Secretary-Treasurer, 13 Linden Ave., Somerville, Mass. 02143

05

By this time you have undoubtedly received a brochure telling of the establishment of an endowed professorship to honor *Doc Lewis* for his distinguished service as a pioneer in the development of chemical engineering. Two of our members interpreted this as a further suggestion that they increase their contribution to the Alumni Fund and explained that Income Tax return time was a poor time to be begging for more money. I am sure that neither the Chairman of the United Fund nor our Class Agent, *Bob McLean,* would object if my mailing of these brochures had that effect, but I assure you that such was not my intent. I thought you would be proud to receive this token of the further appreciation of our beloved "Doc." I am very appreciative of the fact that the Sponsoring Committee honored my request for enough copies to cover our membership. Hub Kenway represented the Class at the official function and reported that Doc was highly honored and not at a loss for words to express his appreciation.

At this point (April 16) it would not, I hope, be untimely to remind those who have not responded to my request for dues that the polls are still open and that a bit of news accompanying a check would be welcomed gladly.

Charlie Smart reports the birth of his first great grandchild on January 21. I wish I could brag also, perhaps a bit later. . . . *Harry Kendall* and Mrs. Kendall are back home in Portland, Ore., after a winter in Hawaii. . . . Had an Easter card from *Walter Eichler*'s sister which explained why we had had no word from

him for quite a while. She says that he gets around with the use of a walker, but hasn't had his clothes on or been out of the house for two years. He enjoys his color T.V. set. I am sure he would enjoy hearing from his old friends, especially those of Course II. . . . *Art Manson,* Course VI, thinks that a trip to Cambridge for Alumni Day would be "too much," but apparently he is ambulatory. He wished to be remembered to Charlesworth and Atwood particularly, apparently because of intimate relationships shortly after graduation.

From an obituary in the Boston *Herald* we learned of the death of *Fred H. Abbott,* Course VI. His son, William, '36, wrote your secretary as follows: "I regret to report the death of my father after a brief illness on March 19, 1969, in Pensacola, Fla. After my mother's death in January, 1966, Dad had lived in Brockport, N.Y., near my brother and then had established residence in Simsbury, Conn., to be near me. In November last year I took Dad to Pensacola to spend the winter with my brother. Dad began to fail and had been in a convalescent hospital several months before he died. He was 88 on March 10, 1969. As you know, Dad had lived in Winchester, Mass., most of his professional life. In later years he had his office at 11 Beacon St., where he was associated with the firm of Fay, Spofford, and Thorndike. Dad always had fond memories of M.I.T."—*Fred Goldthwait,* Secretary, Box 32, Center Sandwich, N.H. 03227; *William G. Ball,* Assistant Secretary, Box 18544, Bayshore Gardens, Bradenton, Fla. 33505

06

Correspondence improved a little lately. The latter part of March we received a long letter from *Walter D. Davol.* Course VI, from his long-time hideout in Manchester, N.H. Walter has a son in Portland, Ore., who he visits every year—by air of course and said he timed the trip both ways. Returning East, without any stops, it took only 4 hours 20 minutes. As he says, "distance has lost its meaning, and a coast to coast trip no greater adventure than a trip to Cape Cod." Walter is still active and still chairman of a luncheon group of "retirees." Like many of us, he doesn't drive now but says he has a granddaughter living in Manchester (perhaps *she* drives) who is President of the Children of the American Revolution, and a grandson at college.

Jack Norton, Course, V sent a note commenting on the death of Charlie Willis. "I knew him quite well and liked him. He was one of the most energetic persons I ever knew." Jack said they had a real winter in Tryon, the coldest since they have lived there "and more snow—16 inches in one storm, which disrupted life in this community."

More recently came Easter greetings from Clare and *Jim Wick Jr.,* Course II, from Youngstown. They had heard from Betty and Vice President *Stew Coey,* Course VI, as we had, and Jim keeps as busy as ever; says he "has resumed his pleasure in trying to mix colors and paint pictures" (that he had dropped for awhile) "to get our Arms Museum of the Nphoning Valley Historical Society on the road," Jim had a checkup on his 86th birthday and the Doc told him he improved with age—like good whiskey!

The Boston *Herald Sunday Supplement* recently contained an article by an M.I.T. freshman, Carol Epstein, who is one of the 200 coeds among 3,600 male students, according to the long article which had some nostalgic photos, one of Carol studying. Guess how? With a slide rule! naturally.

We have only one death to report: *Frank Augustus Hayward Kelley,* Course I, on December 31, 1968 probably in Fairmont, W. Va. Frank was with us in our freshman year when his address was Stoneham, Mass. For some unknown reason he landed in Fairmont around 1925 and was employed by the Monongahela West Penn Public Service Company there as Civil Engineer, a position he held until he retired by or before 1955 and continued to live there. Lacking family details, a note of sympathy from the class has been sent to the "Estate."—*Edward B. Rowe,* Secretary-Treasurer, 11 Cushing Rd., Wellesley Hills, Mass. 02181

07

Our Class has lost its able and enthusiastic secretary, *Philip B. Walker,* who died in the Whitinsville Hospital on Thursday, May 1. Phil had been secretary for many years and kept a wonderful record of the Class and its members, arranged in detail for class reunions and other meetings, including our 60th.

Phil worked on subway construction for the Boston Transit Commission from 1907 to 1918, was a progress engineer on construction of the South Boston Army Base from 1918 to 1920 and was resident engineer for J. D. Leland & Co., of Boston, becoming an engineer in the maintenance department of this firm and their plant engineer in 1928. He served in that capacity until retiring in 1965.

As you all know, Phil was most active in civic affairs serving in many community and church posts. In a letter to Don Severance of the Alumni Association, M. Leone St. Sauveur states: " . . . I worked for Mr. Walker as his secretary for thirteen years and never failed to wonder at his capacity for work and his ability to comprehend a situation, however unfamiliar he was with the problem at hand. It was a pleasure and an honor to work for him; and he will be missed, not only by his family, but by the townspeople as well." To Miss St. Sauveur's esteem for Phil we add our own and share with Mrs. Walker and the Walker family their loss.—*Donald G. Robbins,* President, 10 Stratford Rd., Barrington, R.I. 02806

09

We are most regretful not to have had any class notices for May as was true for earlier months. We had written to some of our classmates for personal news but none was received in time for the May *Review.* Although unable to reach our office at Harvard for a considerable period in February, because of a unprecedented series of snow storms, we have devoted much time to the planning and writing of the 60th reunion, corresponding with Art Shaw in Florida and discussing the general plans with the Alumni Office. (There is a direct telephone connection between the Harvard and M.I.T. switchboards). Some time ago you should have received the notice of the Reunion with the return post card giving the essential details of our program and also the Alumni office has sent a notice to the classes holding reunions requesting information on dormitory reservations. We hope that a large number from our Class will be able to respond favorably. We also believe that the Homecoming Program, Sunday evening, will add much to our reunion in that it will enable us to meet so many of our fellow alumni as well as providing entertainment.

As stated in our notice it is planned to send a second one giving further information including probable attendees.

Mayo Hersey, not only maintains his technical and professional activities, but he continues to receive recognition and credits for his several accomplishments as may be seen from the following note received from him: "Reading the March *Review,* I was sorry to learn of the passing of Lester King, an old friend of school days prior to M.I.T. I am completing now my twelfth year as a visiting professor at Brown University. Recently, page proof was corrected on a biography of Edgar Buckingham, written at the invitation of Charles Scribner's Sons for the *Dictionary of Scientific Biography.*

The 1969 edition of the *Life of Lord Rayleigh* credits me with historical notes on his "Principle of Similitude." Any classmates who see it will enjoy this entertaining book from the University of Wisconsin Press. Page proof was returned this week to the American Society of Mechanical Engineers on a fourth paper in my series on "Rolling Friction." The co-author is Paul L. Golden of the U. S. Bureau of Mines."

We are calling attention to the Memorial Service in honor of those who have passed away during the past year, to be held in the M.I.T. Chapel at 11:15 a.m. on Monday June 16. Reverend Robert L. Meier, an alumnus from the Class of 1944, will give the Service, and Mr. Warren W. Walker, from the Class of 1929, will be the Eulogist. We are attempting to inform as may widows as possible of this service.

A few days after you receive this *Review*

we will be meeting in McCormick Hall and renewing again our many friendships. —*Chester L. Dawes,* Secretary, Pierce Hall, Harvard University, Cambridge, Mass. 02138; Assistant Secretary, *George Wallis,* Wenham, Mass. 01984

10

Allen Gould writes: "Just returned from three chilly weeks in Florida—and after two weeks of doctoring here at home think I am now over the bug or whatever it was. I am sure you are right that the majority of the 1910 octogenarians would appreciate a location on the campus. The only thing I would worry about would be that the atmosphere of the dormitories would affect my brains, being charged with all the newest in electronics—things never taught in old Course VI. However, I would try to come back for relaxation and not attempt to catch up for the past 60 years. As to program I would be glad to have a conducted tour of the Institute included but with plenty of chance for the octogenarians to sit down and rest their feet. Also, Classmates should be urged to *enunciate clearly.*"

Deceased

Mrs. Herbert G. Reynolds writes: "This is to inform you that *Herbert G. Reynolds* passed away on March 8, 1969. We moved to California when he retired in 1960. He is survived by his wife Ria, a daughter and two sons, eleven grandchildren and five great grandchildren. He had been ill for three years."

Notice has been received that Jay W. Cilley passed away on January 4, 1969.

Walton G. Harrington died on March 5, 1969.

Jack Babcock writes: "I am too busy—believe it or not—for a retired professor. Right now I am working on Alumni Fund (Class and Portland Regional) and arranging a coming meeting for the M.I.T. Club down here (Portland, Me.). Also I am going to Raleigh, N.C., for my granddaughter's wedding. Last Monday night I saw Ralph Horne at annual B.S.C.E. dinner and he asked about our 60th reunion. That night I was being made an Honorary Member of the Boston Society of Civil Engineers."

Ralph W. Horne writes: "Perhaps you already have been informed that our Class Agent, *Jack Babcock,* recently was made a Honorary Member of Boston Society of Civil Engineers. The Society is the oldest engineering society in the country and honorary membership is looked upon as a real engineering accomplishment. The presentation of the honorary membership was made at the Annual Meeting of the Society, with over 200 in attendance. Jack was looking very well and implied that he is already giving serious consideration to arrangements for the 1970 reunion of our 1910 Class."

Fred R. Lufkin writes: "The only bit of class news that comes to mind at the moment is that our classmate, Professor *J.B. Babcock,* is secretary of our local alumni association. I consider myself very fortunate that he lives not far from me. We get together frequently for lunch."

Harold C. Manson writes: "Kate and I returned from Florida recently. It was cold and windy so we returned sooner than we intended. I don't expect to get to Cambridge until 1970. We have had a very mild winter here (Washington, D.C.), snow 2 inches one night and melted the next day by noon. Why go away?"

Russell Hastings writes: "Very glad to hear you are planning ahead for a reunion next year which I hope to be able to attend. You're right about our wanting to hold it on the M.I.T. Campus."

Harold E. Akerly writes: "It is good to know that you are still in circulation and that plans are on the way for 1970. I trust they don't require much if any stair climbing for us cardiacs and arthritics. Jess and I are home for another quarter in Winter Park, Fla., a very unusual town with its busy University Club and Womans Club, the former misnamed because every fifth member may be a successful contractor who was a high school dropout. Rollins College has many attractions aside from playing good baseball. We had a smooth drive home and are now trying to adjust to snow in the air and to looking after our apartment. Hotel living sure weakens ones appetite for chores. We may see you in June when we plan to go east to inspect our latest great grandchild."

J. C. Tripp writes:"Herwith my $10.00 dues for the 60th Reunion. As of the way I feel now I'll make it. You sound fine when I hear of you so I know you'll make it too. I am for the reunion on the campus—none of that Cape Cod stuff. I am retired being near my son and four grandchildren in Greensboro, N.C. My clients have kept me as busy as I care to be including my son who is favorably known in the heavy construction business and roves the world as I used to do. I believe the sunset of life is a splendid adventure even as a widower."

Carl H. Lovejoy writes: "Glad to receive your letter. I do plan to attend the 60th 'God Willing' as Arthur Godfrey says. It is quite possible I shall be at the 59th this year. My wife died just a year ago and I spent three months in New England and Ohio last summer with my two boys and their families—eight grandchildren. Plan a somewhat similar trip this summer. Have many oldtime friends in this vicinity and have made several new ones in the past year."

Chester Wilson writes: "I am still putting in a full week and President is also a tech man of 1924. As he says we can still work all around the youngsters of today. Several years ago my son-in-law, who is half my age, was shingling our summer camp with me. I worked from 8 to 6 with one hour out for lunch. When about 3:00 p.m. I missed him and went inside, he was stretched out on an old couch resting. I went back to work. About all we have done is travel and camp in the summers. This last year we took a month to go along Canadian highways to Vancouver, British Columbia, Seattle, Wash., the Canyons, Bryce and Zion. (We have seen both north and south rims of Grand Canyon, so bypassed it.) Then on down into New Mexico, across to San Antonio, Texas, where we left the bus and flew to Mexico City and spent several days hiring transportation for trips to such places as the Pyramids, Maximillian's Castle, Mexico City's marvelous museum then back to San Antonio and picked up our bus for home. It was a rewarding 4 weeks."
George R. Lord writes: "Best wishes for a successful 60th reunion. While I am still in good health I regret I will be unable to attend on account of my wife's illness."—*Herbert S. Cleverdon,* Secretary, 120 Tremont St., Boston, Mass. 02108

11

The following is from *Minot S. Dennett* of Coconut Grove, Fla.: "I was supposed to retire 10 years ago when I moved to Florida, but one of my old connections requested that I represent them in the state of Florida, which I am still doing. It seems more like fun than work and it gets me around the state quite a bit. The story of my life is a short one, in spite of 80 years of survival. I was born in Belmont, Mass., where I remained through Tech days. I then moved to Detroit and spent about six years with the old Packard Motor Car Company. After that I went into business as Manufacturer's Representative with Jack Moses, '09, as a partner for several years. Vera and I were married on my birthday in 1921. That makes an anniversary date easy to remember. Of course, my lines have changed from time to time and I now represent the Manganese Steel Forge Company of Philadelphia, whose products I have handled since about 1918. We have never had any children but since I am the youngest of a large family myself, there are plenty of Dennetts around to carry on the name. We enjoy life in Florida and do not crave ice and snow. An occasional trip to New England can be taken in the summer months, but we have not left here for three years, so consider we have become acclimated at last."

Deceased

Stuart B. Copeland of Venice, Fla., died on January 2 of this year. He was born in 1889 in Davenport, Iowa, prepared for Tech at East Division High School in Milwaukee and graduated in Mechanical Engineering.

I have two new addresses: *Carl S. Barnes,* 7733 East Humingbird Lane, Scottsdale, Ariz., 08525; *William H. Coburn* has moved his office to 11th floor, 84 State St., Boston, Mass. 02109. Maybe you have noticed how long and good the 1912 notes are every month.

Some time ago, Ray Wilson, Secretary of that class, sent a letter to all his classmates asking for information on any of the following eight topics:

1. Various business and professional positions and acheivements with dates.
2. Special investigations, studies or events of interest.
3. Date married. Children and grandchildren. Their activities and those of your wife.
4. Various hobbies and sports in which you have been or still are interested. Musical interests.
5. Travel. Local and foreign trips. Interesting anecdotes there-on.
6. General health.
7. Any interesting stories or events during your days at Tech or during our reunions.
8. Final comments and conclusions.

With these hints I shall expect a flood of letters from '11ers.—*Oberlin S. Clark,* Secretary, 50 Leonard Rd., North Weymouth, Mass. 02191

12

DO YOU REMEMBER the student waiters at the Union dining room? *Jesse Hakes* tells this story. One evening a shortage of seven strawberry shortcakes was reported. He and Cornelius Duyser were cleaning up after the meal when Cornelius found the missing desserts on the dumb waiter, too late to use. On another occasion they were called upon to serve the track team, who were on a strict diet. They cooperated by bringing them salad dressing for the soup course.

George Robinson of Daytona Beach, Fla., writes as follows: "After a few years in the drafting rooms of steel plants, I was employed by the Navy Department in Washington as a civilian engineer. I enjoyed this work so well, I remained with them in Washington for nearly 35 years. Most of this time I was employed in the Public Works office of the Washington Navy Yard and later transferred to the Potomac River Naval Command. In general my activities were confined to maintenance, but during the war I supervised the installation of new facilities at the Patuxent Air Command and the Bainbridge Training Center. I was married in 1919 and our favorite hobby was travel. In 1950 I retired and have enjoyed good health and a very happy married life. My wife passed away in February, 1969 within three months of our 50th anniversary. I wish you good luck and success in your campaign for 1912 news."

Deceased

We are saddened to learn of the passing of *Henry Partridge* in Cranford, N.J., on November 22, 1968. A letter received from his daughter, Peggy (Mrs. Robert J.) Higgins of Pittsburgh, advises that Henry had been in good health and most alert. Since the death of his wife in 1967, he had been living alone in his apartment, and he had a circle of friends of his age with whom he loved to get together. He had planned to entertain his daughter and family over Thanksgiving, but suffered a severe stroke a few days before and died two days later from a cerebral hemorrhage. In 1913 Henry became associated with the Firestone Tire and Rubber Co., in Akron, Ohio, and remained with them until his retirement in 1953 as Head of the Real Estate and Branch Development Department. In 1916, he married Marguerite Irwin and they celebrated their fiftieth anniversary in 1966. He is survived by two sisters, a daughter and two grandchildren.

A letter received from *Charles Rowley,* still active in an engineering and architectural partnership in Cleveland, reads, "I appreciate your letter giving the sad news of the death of Henry Partridge. I first met Henry as a freshman and we soon became good friends. He played the flute in the musical clubs and I the mandolin, so we were together on many trips. In our senior year Dwight Wyman, Henry and I did our thesis together. When I moved to Cleveland in 1915 Henry was in Akron, and we visited back and forth many times until he retired and moved to New Jersey. Joe Fuller, 1911, and I were ushers at his wedding in Elizabeth, N.J., and we gave him a good send-off. After his retirement we saw little of each other. I tried unsuccessfully, to get him to attend our 50th Reunion."

Wallace Murray has written from Nairobi, Kenya, while on a vacation cruise to Africa. He says, "While on this cruise I have visited Morocco, Madiera, Canary Islands, Dakar in Senegal, Freetown, Sierra Leone, Point Noire and the hinterland in Congo and Angola, then Cape Town. We then flew to Uganda and Kenya to see wild game, of which I photographed some twenty different kinds. Last night we were in a tree top lodge near a water hole and watched the many nocturnal animals who came to feed. We plan to leave Port Elizabeth, sailing to Brazil and then north to New York. Best regards to my classmates. I hope to see some of you before too long, hopefully at a Reunion in 1970."

We are glad to get good news from *Joe Desloge,* who apparently is still carrying on with the Killark Electrical Manufacturing Co., in St. Louis where he has been connected for many years. He writes, "I am still alive and kicking and celebrated another birthday recently. I am sending a copy of a very touching remembrance received from one of my friends which reads, 'A birthday is a special day, So I've a heartfelt prayer; I've asked that God will set your feet upon a birthday stair, to help you mount up step by step, His hand upon your own, Until you climb to golden heights, And reach at last His throne. God take you up another rung to reach a star today, A star of love, of faith and peace, To light you on your way. God bless you on this day of yours, And give you of His grace, And may His light be ever near, To shine upon your face.' These days I am kept pretty busy running herd on four children and eleven grandchildren. Whenever we have any spare time, we take a short trip to California for a change, but do not get East very often. However, I do receive reports from some of my 'descendants' that Tech is still going full blast. With kind regards to you and all of our classmates."

Walter Green writes as follows from his retirement home in Palm Bay, Fla., "After nearly 35 years of continuous service I retired in September, 1957, from the Anaconda American Brass Co., Waterbury, Conn. My work there was varied and interesting, including the design of new factory buildings and alterations, investigations, reports and calculations on various construction projects. Much time was spent on the designs of mandrels for tube reducing machines.

"Elsa and I brought up two sons, both of who graduated from Tech, Walter, Jr., S.B.'35, and Ph.D.'40, and Alfred, S.B.'40. We spent many vacation trips touring the West and Northwest such as Yellowstone, Grand Canyon, the Smokies, Bryce, Zion, Yosemite, Crater Lake, Mt. Ranier, Lake Louise, as well as Mammoth Caves and Acadia National Parks. I was an active member of the Appalachian Mt. Club, doing some trail maintenance work, visiting several camps and have climbed many of the highest peaks in the White Mountains and Adirondacks. I was also an active member of the Waterbury Naturalist Club and the Connecticut Botanical Society. My younger son and I have hiked many miles on the Appalachian Trail in Maine and New Hampshire, carrying a bed roll and dehydrated food. In 1955 I suffered a gall bladder operation from which I have fully recovered. In 1959 we moved to a summer home which we purchased in Craftsbury Common, Vt. where we have since spent four or five months each summer. The maintenance work got to be a chore with no fun, so last summer we sold it and moved into a new Florida home, though we went back to Vermont for the summer. We are most comfortably located here in Palm Bay and I keep busy in maintenance work. I have joined several clubs, such as the Audubon, Civic, Anthropological, Astronomical and Cape Kennedy M.I.T. Club. We watch the missile shots on TV or listen on radio until the blastoff. We then go into the yard and watch them rise gracefully over the orange grove to the north and finally disappear in the east, leaving behind long white wavy trails."

Here is a contribution from *C. D.* (Mac) *McCormick,* who lives in West Medford, Mass. "When I read of the fantastic accomplishments of my former classmates in the 1912 news column, I feel very humble in setting forth the details of my

engineering career. I fancy that my only outstanding achievement is my age: I will be 85 years old in May. I entered 1912 as a Junior, after receiving a B.S. degree from the University of Maine in 1907. At the time I was employed in the Engineering Department of the Canadian Pacific and obtained a leave of absence for the two years at Tech. My visions of greatness as a hydraulic engineer evaporated as I found that in 1912 there were no company representatives about imploring grads to accept lucrative positions. I was fortunate to get an offer from Canadian Pacific in Ottawa at $75.00 a month. Here I had plenty of exercise installing bridge foundations, siding relocations, ballast stakes, etc. I soon quit the railroad and took a job as supervisor of construction, building concrete piers, dams, wharves and bridges in Ontario. Then came the War and all construction stopped. My father grew ill and needed me so I returned to work the farm. By this time I had married and had one daughter. My father passed away in 1916 and I moved to Boston, taking a construction job with the Boston & Maine, then being recapitalized. In 1919, I joined the Hammel Oil Burning Equipment Company, supervising and installing equipment in many factories. My good friend and classmate, John Pettingell was employed by the same company. The following year I joined the company known as Eastern Gas and Fuel Associates in Everett and later acquired by Koppers and Co. The plant expanded rapidly and I was in charge of the Engineering Department supervising the construction of a blast furnace and additional batteries of coke ovens.

"After retirement in 1953 I became an engineering consultant for various firms, mostly on marine installations, such as for the Bath Iron Works. I continued in consulting and design work until permanent retirement in 1967 when my wife became ill and I was needed at home. My family includes three daughters and one son. I have 11 grandchildren of which three are married. My dear wife, Trixy, died last August and I now live alone, doing my own cooking. I heartily endorse Fred Alden's remarks on "the golden years" published in the December, 1968, *Review,* to which I can say 'Amen.' "

John Pettingell writes, "After this tough winter in Acton, Mass., my wife and I are planning to enjoy a spring vacation in Bermuda. From my contacts with classmates, you can be assured the whole Class appreciate the work you and Jay are doing for 1912. Upon receiving the *Review,* I believe the majority first read the class news. How can I and others who have sent in their 'history' help you?" Thank you, John. I suggest that you send in the story of your Bermuda trip and any other news of interest about your activities and those of other classmates whom you may meet from time to time. You are already doing a good job along these lines, however.

Jay Pratt and Priscilla write that they received many Christmas cards from classmates which were forwarded to them in Mexico where they spent the winter as usual. Their first month was spent in Acapulco, noted rightly for its constant sunshine and warm water. Then in Cuernavarca where, as a member of the World Committee of Girl Scouts and Guides, Priscilla helps operate a World Center. Here, in its ten years of operation, it has been host to over 12,000 girls from 67 nations, who have come to enjoy the experience of international living.

Their next stop was Oaxaca with its perfect climate. They studied the pre-conquest Indian ruins and enjoyed the native markets. On their way north they stopped in Scottsdale, Ariz., living in the caseda of their son, Ryder, for two weeks while they vacationed in Mexico. The Pratts visited with the *Cy Springalls* while in Scottsdale and particularly enjoyed driving about the country with Cy and Marj who are old time winter residents of the area. The Pratts were leaving for their Oak Park home in April and Jay writes he is expecting a pile of letters in reply to his many followup requests for news. We, too, are leaving Florida for Swarthmore shortly.—*Ray E. Wilson,* Secretary, 304 Park Ave., Swarthmore, Pa. 19081; *Jay H. Pratt.* Assistant Secretary, 937 Fair Oaks Ave., Oak Park, Ill. 60302

13

Will we see you at the Homecoming or Alumni Day, June 16, 1969? At the suggestion of *William Newsom Eichorn,* a dinner or a luncheon should have been arranged for the members of the Class of 1913, living in New England, at the latter part of 1968. Due to the illness of your Secretary, this did not materialize. After a conference with Fred Lehmann and President *Charles Thompson,* it was suggested that we send out notices to the New England classmates urging them to attend Homecoming and featuring the noonday luncheon, which would provide a small reunion and also the entertainment of the Homecoming program as provided by the Alumni Day Committee.

We received a very interesting letter from *Allen Brewer.* He reports that the weather in Florida was on the cool side, even down in the low 40's. He and his nice wife Maurine enjoyed our 50th reunion and the New England visits have nearly convinced his Texan wife that Texas has a rival. Al has been writing a series of articles for *Scientific Lubrication* in England titled "Lubrication from the Management Viewpoint." He also informs us that he is writing short articles for stamp publications dealing with specialty stamp collections. Further, he would like to hear from any of our classmates who are stamp collectors for already he has pen pals in Australia, California, South Africa and Switzerland. Good luck, Al, keep writing; we enjoy hearing of your activities. Keep the letters and cards coming. Allen adds: "See you at the 60th or we hope, sooner."

Again, it is a pleasure to hear from *Jack Farwell.* He will attend a reunion whenever one is held. John reports that there is nothing new hereabouts and he will probably postpone his usual Florida Xmas trip until after the holiday crowds leave. Jack, write often.

Frederick Lane has written several notes. We observed that that due to a last minute case of "shingles" that he and Eva were unable to attend our 50th. He reports, "Eva and I are looking forward to the 60th and hope to see you both then, or sooner if the class decides to have an interim get-together."

Benjamin Thomas reports re 60th reunion, "Hope to." . . . *Alexander Pastene* about the next reunions states it questionable. . . . *Kenneth Hamilton* replies "No." He adds: "Still going strong and read your information in the *Review.*"

We received a letter of appreciation from President Howard Johnson for our feeble efforts in alumni leadership for educational and financial assistance. *Ellis Brewster,* Alumni Fund Agent, is performing his specialty with much success and passes on any news which he receives and offers frank advice when it is needed. Bill states: "I am afraid I don't warm up to another reunion before our 60th." He also forwarded a note from Marguriete Kelly (Mrs. *Prescott Kelly*) which stated Prescott had an emergency operation recently and is now on the road to recovery. This of course, good news to all of us.

Deceased

It is with very sorrowful feelings that we read of one of our internationally known classmate's death. *Lindsley F. Hall* was a member of the British expedition which explored King Tut's tomb in 1922. Born in Portland, Ore., December 21, 1883, he died at the Mann Home in Portland, on Monday, October 21, 1968; he was 85. An egyptologist, Hall worked at the Metropolitan Museum of New York for 36 years before retiring to Portland in 1949. He studied architecture at M.I.T., then joined the Metropolitan's Egyptian expedition as a draftsman. In 1922, when archaeologist *Howard Carter* discovered the tomb of Tutankharmen, Hall was loaned to the British expedition to draw a plan of the main chamber before the rubble was cleared. During his years with Metropolitan, Hall made eight more trips to Egypt and one to Iran.

Again it is with a heavy heart that we quote a letter received from Gordon Howie: "Ethel's long and painful illness came to an end when she passed away on the evening of February 5, 1969, in the Morton F. Plant Hospital in Clearwater, Fla. My Ethel had certainly enjoyed all of the fine reunions of 1913 which she attended, and knew that all of my classmates and their wives were wonderful people. Hope you and yours, Phil, are in the pink of condition, but take care of yourselves. I send my best wishes and regards." Gordon, all of us who knew

Ethel share your sorrow and extend our most sincere sympathy.

Arthur W. Kenney writes: "Our daughter Sylvia W. Kenney, Professor of Music, Smith College, died October 31, 1968." To you Arthur and your wife, we of 1913 offer and extend our very sincere sympathy.

A letter of appreciation has been received from William E. Brown, 12771 Melody Drive, Garden Grove, Calif., 92641, whose father, *Charles W. Brown* died October 20, 1968. We quote in part: "This is pretty late for a 'Thank You' note, but I do want you to know that your kind card coming after the death of my father, Charles Brown, was most appreciated. It was certainly an unexpected happening but at least it was a peaceful thing. I know that he especially enjoyed the last few class reunions that he and my mother attended as he referred to them often. It was unfortunate that, having retired, he perhaps had more time to take a more active part in such get-togethers but no longer in the area where he could do so." William E. Brown also sent some slides of pictures taken at several reunions. These slides will be forwarded to Henry Gildden, our official "Keeper of the Seals." We have only one change of address: *John B. MacNeill,* 19400 Collins Ave., Miami Beach, Fla., 33160. We will be looking for you on M.I.T. Homecoming Day, June 16, 1969.—*George Philip Capen,* Secretary and Treasurer, 60 Everett St., Canton, Mass. 02021

14

This is written in the middle of April. We know it is spring because we have just had a call from *Homer Calver* who has moved from Florida to his semi-rural retreat at Clinton Corners not too far from New York City. We discussed the reunion. He will be there.

Like other places in the East we had a bit of snow. In fact there are piles seven feet high around our place. There was a record breaking snow fall this winter as many of you know. However, they know how to handle it in these parts and a road plow is on the job as soon as a few flakes fall. A neighbor of mine added a bulldozer in addition to his plow to clear the driveway and road to the barn. I do not ordinarily touch a snow shovel all winter. And to add to the foregoing plug for living in these parts I might note that there is a substantial real estate development not too many miles from here.

Les Hamilton and *Harold Wilkins* (who is now in better health) have been keeping you in touch with the reunion plans and we hope to see many of you there shortly after reading these notes. And just one more word about the reunion. On the Monday after what used to be called Alumni Day but which is now designated Homecoming Day, there will be a Memorial Service for those whose passing was reported last year. The Memorial Service will be held on June 16th.—*Herman A. Affel,* Secretary. Rome, Maine. Post Office: RFD 2, Okaland, Maine 04963

15

We hope to see many of you and your families and your guests—you're all welcome, at The Class Supreme Annual Cocktail Party at 4 o'clock on Alumni Day, June 16 at The M.I.T. Faculty Club, Cambridge. Be there!

Dalton Chair in Religion and Ethics

Here's a big column for you this month. Our Class President *Jack Dalton* is still doing good things. From a recent Boston paper: "The Board of Trustees of Governor Dummer Academy, Newbury, Mass. has announced that the first academic chair to be established at the academy has been named in honor of *Marshall B. Dalton,* well known Boston businessman who, for many years, was associated with Governor Dummer Academy. It will be known as the Marshall B. Dalton Chair in Religion and Ethics. The first faculty member to hold the chair is the Rev. William E. Dubocq, III, a graduate of Dartmouth and the Andover Newton Theological School, who is in his second year as chaplain at the Academy."

On a visit in March to Martha's Vineyard, I saw Bee and *Charlie Norton,* both enjoying Charlie's well earned retirement. Charlie is Chairman of the Dukes County, Mass., Rat Control Commission and says the Federal agent reports the results of his Committee's efforts have been second to none in the country. I also visited with Bonnar and Frank Atwood, 1914. Frank has been a big real estate operator and builder on the Island.

Ben Neal wrote: "The acknowledgements and thank you letters I receive indicate how hard I work at the job, but at the same time it is very interesting and satisfying to know how many of the old gang are still coming through. So far we have had about as many contributions this year from classmates as we had last, although the dollar contribution is down somewhat as of this date, which perhaps is to be expected, as the old class cannot go on forever!" Ben is doing a magnificent job as Class Agent in collecting for the Annual Alumni Fund.

Bill Brackett wrote to Ben Neal. We do hope Bill has completely recovered from his long-named trouble and is as active as formerly. "It was nice to get your letter of the 14th, and I do say that from your reflection in the letter, you do look very hale and hearty. I hope you are. I have been having a bout, the last several weeks, with an attempt to locate the seat of a low grade infection in my system. Ten days in the Jordan Hospital, with about 30 pictures and also a sigmoidoscopy didn't tell us anything except that there doesn't seem to be any malignancy. I am not really back in harness as yet, with a desire to go out and do business. Of course I have cut down a lot since last year, and only carry two accounts, as shown below. The Murray Machinery Co., make Paper Mill Machinery such as Barking Drums, Chippers and Roll Finishing and handling equipment. There are a limited number of Customers for that equipment and it is not necessary to make a lot of calls. The prospects are well known to us and we have equipment in all of them, so get their inquiries. An inquiry is not necessarily an order, when prices are important." And now to a few more interesting and colorful letters with dues and some excerpts from friendly letters to Ben Neal.

"Your note is an unexpected but greatly appreciated pleasure and a dividend on my modest gift. I am glad to know that you enjoy letting us know that you appreciate our gifts. I regret that I did not become acquainted with some of you folks who do so much work for the Class of '15. I entered M.I.T. as a graduate of the University of Texas and spent two (very enjoyable) years at the Institute. As a result I did not know many of the members of the Class who were not in Course VI. We did, indeed, have and are having the *rainiest winter* since I became a resident of Southern California in 1919, just after my discharge from the Army. Fortunately, we have come off unscathed at our house. My biggest problem was putting out feed for the wild birds who visit me daily at dawn. I had to drag out some sawhorses and planks to keep the food out of the water which covered our rear yard to a depth of 1½" to 2" for a couple of days. Let me thank you once more for your nice letter and for your work on behalf of our Class. Regards to all, *Frank Boynton.*"

Evers Burtner: "Your letter of February 20 was forwarded to me here in Englewood Beach, Fla., where we have been for four weeks. I expect to fight snow in Wakefield in three more. You surely are doing a fine job in keeping our 1915 classmates aware of M.I.T. needs. Contributions from 83 of our classmates surely is wonderful. My unusual hobbies include a small steam launch for which I designed and made the components. Also I do some semi-technical writing. I feel 42 years of full-time teaching and Nautical Museum supervision represented a special contribution. (Especially when I compare my heavy teaching load with that typical now.) I hope we have a wonderful 1970 reunion, with a fine attendance. At a Sarasota M.I.T. Alumni Dinner saw Brown, Course IV. A former student of mine, a neighbor here, is Vice President of the group—Bill Grunwell, '28 Course XIII."

Sig Helseth is another 80-year-older and our best to him. "Thanks for your letter. I have been looking at the envelope about every day and debating whether I should trouble you with any of my past and present—but here goes. The only activity that I participated in was as the trumbonist in the Tech Show Orchestra. I came to Tech after teaching math and science in a Minnesota High School for several years. I came in 1912 with an

active and healthy 6' 2" frame and in spite of the intervening years and having passed my 80th birthday, I am still active and busy in retirement. I neither feel, act nor look like one who is bound for the rocking chair. We never know what is in store for us tomorrow. My wife died in June 1960. I have two daughters. The older daughter lives in Springfield, Mass., and is married to a Doctor—Radiologist. They have 3 girls. The younger daughter lives in Miami, Fla., and is married to a consulting engineer and designer who specializes in the medical field. They have 3 boys. The oldest grand-daughter and grandson will graduate from college this June. During the year, I spend 4 to 6 weeks with each family. I go to Florida about the first of April and return in time to plant my vegetable and flower gardens. The summer is spent at home nursing my gardens. After the vegetable garden is put to bed for the winter and the flower areas are cleared, I go to Springfield, Mass., usually for a stay until after Thanksgiving. I am fortunate to have a dependable man who maintains The Home Base in presentable condition while I am away. Regular medical check-ups provide the story of my health. Trust this finds you and your family happy and in good health."

Bernard Landers: "It was very nice of you to write to me and mention some of the troubles we are facing. The world all over is now suffering a disease caused by affluence among those who feel that the world is theirs and that no one can dictate to them. This atmosphere is so evident that it disgusts the average man with common sense. I also feel that the display of wealth is the cause for a jealous state of mind among the lower class, it gives the *left*-thinking people—*college students* especially—a topic to discuss and flaunt amongst the needy. Please forgive my spouting off like this, but being here on my annual vacation I have some free time to think—so that's why. Hope to see you in New York at our annual get-together. Till then good luck, good health and continued prosperity."

From away out in Zamboango, Philippine Islands, *Ernie Loveland* wrote another colorful letter on January 18. "I have just heard that my old company, which has been supplying most of the money for this project, has found it necessary to economise so there will be no more money available for this project after March 30. I am sorry for I feel that we have learned about all there is to be learned from our fairly small scale experimentation; at times I have had 800-1000 samples exposed to various conditions at the same time. I believe we were about ready to go into the next phase—trying to increase the production from natural beds or starting entirely new beds so as to increase the harvest from here, which is what the company wants. In fact, I had already started such experimentation in three different places. Perhaps the head of the Philippine branch of the company may, with the suggestions and data that I give him, be able to proceed without me, but I have offered to go to work on that phase for some months more without pay. In any case my stay in the Philippines is drawing to a close. My plans for the future are still very indefinite. Tahiti and New Caledonia interest me, if I can get there economically. If I do go farther East I do not at the moment plan to continue to follow that shorter path home but to tour around and go westward again probably stopping off at Singapore. Borneo and Indonesia tempt me and a good look at Africa on the way to Western Europe where my Spanish friends expect to see me again before I go home. I was forgetting my Spanish and so back in September I stopped working at 10 p.m. each of the seven days in the week and took a night course in advanced Spanish grammar at a local college. All the way through I was at the top of the class, with a term average of 98%. The 2% was due to careless errors, not faulty knowledge, and now am getting very rusty with my French." (What a guy!)

Don Fowle: (We were sorry to hear the following news of Don and wish him all the best.) "I have been in and out of the hospital and under the doctor's care and confined to my home during the last three years, and at present. At my age I am probably lucky to be alive. Best wishes to you and the Class of 1915."

Henry Leeb wrote to Ben: "Your nice letter of February 17, deserves an answer. If you take the trouble to write each classmate who gives to the Alumni Fund you must be kept pretty busy. You certainly have the touch when it comes to rounding up contributions, as witness your remarkable performance at the time of our 50th Reunion Gift. I presume you are enjoying retirement by now, although you apparently haven't pulled up stakes and moved to Florida. I hope you are in good health. My wife and I are in good shape and enjoying life here in the country. We hope you will drop in whenever you are down this way. Best regards and good luck."

A fine letter from *Jack Little* brings us to date on his activities. "After World War I, I worked for the Brown Co., in Berlin, N.H. Geo. A. Richter, '13, was my boss at that time and I notice he recently passed away. I also noticed that *Allen Abrams* is gone. He and I did a thesis together in Course X. In 1922 I went to work at Western Electric Co., in Chicago as a research engineer and finally ended up as Engineering Manufacturing Superintendent at the Kearny, N.J. works. Retiring from there in 1957, I taught in the Industrial Engineering Department at North Carolina State as a Visiting Professor. I enjoyed this assignment immensely but retired after three years largely because of minor eye trouble. My wife and I went to Europe in 1958 and then after several summers at a family cottage in Michigan, we built a home here in Brielle, N.J., near the shore. We went to Hawaii in 1968, to Florida in 1966, the Virgin Islands in 1967 and to Maine in the summers. We celebrated our 50th wedding anniversary in 1968 and my grandson graduated at the same time from preparatory school. He is now at Iowa State University studying aerospace engineering. We have two children a boy John and a daughter Shirley, both happily married. John has two children a boy and a girl and Shirley has two boys and three girls. So I have seven grandchildren in all. Both Mrs. Little and I are in good health but don't feel quite up to taking up jogging to stay that way; although we walk the board walk at the beach all year long to enjoy the ocean except when weather was bad. I guess that gives a thumbnail sketch of what I have been up to. Regards to you and your family."

We'll miss *Doug McMurtrie:* "I am sorry to hear that we lost Jac Sindler, and I miss George Richter of 1913. The Class-Dinner of April 11 is too early for my northbound timetable. Hope you have a good turnout."

What a time *Herman Morse* has had. "I am forgetful enough that I may recount the same events that I have written about before. Marjorie and I took our daughters, their husbands and children in the fall of 1966 to Banff and Lake Louise to precelebrate our 50th wedding date as its date, of October 31, was during the school year. In early December 1967, we went to Nassau, St. Thomas, St. Croix and San Juan on *The Rotterdam.* Each late winter we spend three or four weeks in Florida returning in mid-April. Neither of us cares for a whole winter away from home. This year we will go March 20 for three weeks to escape the long drive. Retired now for more than seven years from Goodyear, I have never been bored. Am on the Advisory Committee to the Business Administration College at Kent State, served on the financial committee at church and at the Masonic Temple. Do some Community Fund budget work. The oldest granddaughter is now graduated from Kent State and married and teaching. Another is a sophomore at Kent State, a third a senior in Troy, Ohio High School and in the top 5 per cent. The one grandson is a sophomore at Purdue in chemical engineering. Hope we will be well enough to see you at our 55th in 1970."

Congratulations to *Fors Purinton,* for his 80th birthday, with many happy years more. "Ten years ago two coronaries eliminated my hobbies of tennis, skiing and mountain climbing. Since then, I have picked up replacement hobbies of photography, painting and hi-fi stereo. I record FM on tape at home during the summer and play them down here during the winter. I am about to have my eightieth birthday!! I have doubted many times that I would ever reach it but now my three sons and two daughters-in-law are converging on Naples from California, Connecticut and Vermont for the family celebration. I am elated."

Another friendly note from *Dewitt Ramsay.* "Thanks for your nice letter. In September my wonderful wife and I celebrated our fiftieth wedding anniversary

at an elaborate party put on by my daughter Nancy and her husband Ray Alvey in their home in Cleveland, Ohio. Relatives flew in from different parts of the country. The Alveys have four children, all healthy and smart. Fortunately both my wife and I still enjoy excellent health. I am retired, enjoy it, and we still travel quite a lot. My best personal regards."

Eldred Peterson, from whom we haven't heard in years: "I am a semi-retired orthopedic shoe consultant, a long way from M.I.T. Now a widower for 2 years. Two devoted children and four grandchildren."

The indefatigable, irrepressive *Mary Rice* (How does she keep going at such a pace to help so many people and to do much good?): "Why bother about grandchildren—at 75 isn't it about time some of us moved up a generation and counted *great* grandchildren? In April, I make my annual Huguenot Society and D.A.R. trek to Washington. In May, I'll go for the first time to North Conway, N.H., for the New England Women's Conference. I'd like to see *Wayne Bradley* over at his Inn at Warren, N.H. Early in August I expect to take my granddaughter to Hong Kong and Tokyo and then back to California. All this will disrupt my happy schedule of 4 days each week at 4 hospitals and 1 day at U.S.O. I love this work so much but time is fleeting, isn't it? How I realized it at the Radcliffe Seminar at the New York Biltmore—all those hundreds of young eager things *doing* things." It's wonderful to hear from you, Mary.

With a funny card reading "Many happy returns on Income Tax Day, with the devout hope that you haven't deducted yourself out of liberty," *Al Sampson* wrote: "Each morning, if I am fortunate enough to finish the front page of The Boston *Herald* without suffering a hemorrhage, as I read with bulging eyeballs the mundane matters awaiting me, I turn to the lighter things of Life as you portray them in the Class Notes." Al is a master at tossing flowery words around.

From Barnstable, Mass., on Cape Cod, *Nelson Stone:* "Since retirement to the Cape, I have been rather heavily involved in a variety of community activities, the type that are always looking for retirees. The most interesting has been the Town Finance Committee on which I have served six years. I am glad to be able to report that two other M.I.T. men are serving with me, Frank Horn, 1928 (chairman) and Hugh Ferguson, '23. I believe that Hugh was president of our alumni association at one time. I was quite surprised to learn, recently, that there are over 150 Tech men living on the Cape. So if you hear that a baby Cape Cod M.I.T. club has been formed you will know that at least we are in there swinging."

Roger Tiffany: "I am resting in retirement with 10 grandchildren and 3 great grandchildren. My son-in-law is running the family business. I greatly appreciate and enjoy your class notes in the *Review.*" Thanks, Roger.

Free paintings to classmates

Now, here's a guy and a letter. What a pleasant and rewarding hobby *Ellis Tisdale* has and what a generous offer he makes to us classmates. I, for one, shall take advantage of his graciousness. Writing from his Potomac studio in Bethesda, Md., Ellis says: "Your untiring zeal and enthusiasm as Class Secretary has at last brought some action from me. After leaving Tech I served for about 20 years as Chief Sanitary Engineer with the West Virginia State Health Department, then for 18 years I was a commissioned officer with the U.S. Public Health Service stationed in various parts of our country on public health administration, water pollution control, and training activities. Upon retirement from this work I went to Washington and became Director of Interstate Commission on the Potomac River Basin, a regional grouping of states working to clean up the Potomac River pollution. Great progress has been made and the Potomac may serve as a National model of water resources conservation. Now on retiring from the Potomac commission I have taken up oil painting—one lesson each week—and from the enclosed list you will see that I have painted over 200 oil paintings during the last five years for friends all over the country. This is my *hobby.* I make no charge for the 16" x 20" canvas or frame. I should like to receive from any classmate a little color slide of some beloved spot from his experience. I'll paint the picture of it and send it to him as a gift. My hobby is very rewarding and I hope to hear from several classmates. Letters of appreciation, copies of some of which are enclosed and the ribbons at art shows here in the Metropolitan area are my dividends." With his letter was a long list of his paintings of scenes and subjects all over the world and testimonial and thank you letters from many of their owners. Each year he has been awarded prize ribbons by Montgomery County and Hyattsville Art Shows. Nice going, Ellis.

Writing from West Palm, which he calls West Clam Bich, *Jim Tobey* pulls my leg again about spending our class money, ah, me! "So, you are planning another safari to Cairo, Bombay, and Ethiopia. All right, I will be glad to help out with a modest contribution. Don't spend it recklessly. Yes, we suffer. Yesterday we had tornado warnings from 1:30 p.m. to 3 p.m., but the twisters stayed some 50 miles away. We did, however, have a ferocious squall, high winds, nearly two inches of wet rain in an hour or so, and darkness. In favor of dear old Florida I might say that this was the first such event this winter. Otherwise the climate has been good, mostly in the mid-70s, and mostly sunny. You had better come down and escape the Arctic conditions up Nawth. I perused the current edition of *Tech Review,* or at least Lena read it to me, as small news print still eludes me. We will be here, as usual, until April 1, and then take a leisurely trip home. With all best wishes to you and Fran, the better 18/19ths."

From many accounts from our "snow birds" down there, Florida has not had its advertised and traditional winter of sunshine. From *Ray Walcott,* cheerful good wishes for my work as Class Secretary. Thank you, Ray. What an experience *Speed Williams* had in that snow storm up north, but he should be careful trudging through that heavy snow (at his age!). "My best wishes to the warmest, friendliest guy I know. I'm enjoying retirement, dividing my time about equally between New York City and Quoque, L.I. I'd boast a little about my grandchildren, but when I asked an acquaintance if I had told him of some of their achievements he said "No, and I'm very grateful." So I'll just say they're fine, all seven of them, and I'm happy to have them nearby. One is computer programming for The American Institute of Physics and much smarter than her grandfather, and so are the others. I'm on the board of a bank in Corning, N.Y. Went there for a meeting February 7, started back Sunday morning, the 9th. No planes to New York City, all airports closed, 15 inches of snow; had bright idea, fly to Albany take train to N.Y.C., arrived New York 6 or 7 hours late, after midnight, hotels packed; outside wind howling, snow drifting. No buses or taxis, couldn't get through to apartment, spent night in Grand Central waiting room; no sleep but most interesting humanity; Monday a.m. wind and snow abated; took subway to station nearest home, broke path through drifts, finally made it, don't plan to go out again until April or May. Best wishes again."

Gardiner Wilson: "I am doing little any more, resulting from a second heart attack about 2 years ago. Consulting work in the plastic field has been, consequently, quite dormant with me since then. I must refrain from doing too much physically which annoys me when the desire to do things urges."

Louie Young, formerly a fire-ball of get-up and go is so busy doing nothing that he hasn't time to do anything. Good for Louie. *Lou Zepfler* at Tucson, Ariz.: "It would never be the same if we didn't receive your soft touch for a '15 class dues payment. Pearl and I are still managing this complex but plan to quit on May 1. We have a nice lodge on a Lake in Minnesota to go to from May to October and we have bought a home to live in during the fine winters of Arizona. Last summer we took two months vacation in Minnesota and while there we flew out to Boston and took that plane to Provincetown. Heine Gartner (M.I.T. '17) met us and we stayed with my sister in South Wellfleet. Heine is my brother-in-law. While we were there enjoying all the lobsters and clams and Cape scallops *Wayne Bradley* came down from New Hampshire. We had all been friends since 1906 in Minot-North Scituate Beach. I enjoyed reading *Mary Plummer*'s letter in this months *Review*

also take off my hat to Ernie Loveland for his feats in the Philippines. In these late days the best we can wish you is that you may be as happy as we are and may God Bless You and give you continued good health."

Deceased

The sympathy of the Class goes to *Bill Holway* in the sad loss of his wife, Hope, who passed away August 27, 1968. She took an active interest in class affairs and wrote us long letters about Bill, their family and the family engineering and construction business.

Tom Pond passed away November 24, 1968, in Franklin, Mass.

Next month's column will give you the play-by-play of our two big Class Dinners —April 11 in Cambridge; April 18 in New York. These fine gatherings of fine old friends keep us The Class Supreme. And, keep in mind and plan for our 55th reunion, June 12-15, *1970,* at Coonamessett Inn, Falmouth, Cape Cod, Mass., where we've been before. Plan to be there, detailed notices later. Any unpaid class dues? I hope to see you at the Class Cocktail Party.—*Azel W. Mack,* Secretary, 100 Memorial Drive, Cambridge, Mass. 02142

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Again it is reunion time, time for another of those annual interim affairs that have been coming up since our 35th way back in 1951. Listen to the call of our always-there president *Ralph Fletcher:* "Once again, it is a pleasure to call to your attention another class reunion. This will be our 53rd and will be celebrated on the weekend of June 13-14-15, 1969 on Cape Cod. For the twelfth time, we will return to the Chatham Bars Inn where they offer a scenic location with excellent facilities and have always been generous and gracious with attention to our needs. As a note of added interest, M.I.T. 1919 will be at Chatham Bars Inn for its 50th and Harvard 1949 for its 20th on the same weekend. I look forward to seeing you for this happy homecoming. All best wishes."

Regarding these reunions, Ralph has often said that the only "doing" required is for you to get to the Cape location—you won't have to do a thing once you get there unless you want to, for the sunshine, the salt breezes, the comfortable chairs on the lawn facing the blue, blue sea at Cottage G, and the pleasant company will give you a sense of well-being that is hard to duplicate anywhere. The Inn's fine 9-hole golf course, the wonderful meals, and the clam-bake on the water's edge with clams and lobsters in real New England style are features to look forward to and then to remember. So, keep in mind—June 13, 14, 15—those are the days!

From the far west we have word from *Ken Sully* and *Frank Bucknam.* Ken, in Laguna Hills, Calif., has a message "to all '16 cribbage players," a message that sent us back to Hoyle in order to see just exactly what he meant. We have had the old-fashioned feeling that a cribbage hand of 24 was tops. But listen to Ken: "During the recent rains in California we played lots of cribbage. Much to our surprise and unbelievable to our eyes, Emerald had a '29' hand—about as impossible as a grand slam doubled redoubled vulnerable and one over-trick! I took her to the 'Five Crowns' for dinner!"

Fleeing the new math

We appreciate *Frank Bucknam's* kind words from Auburn, Calif., about enjoying the little old '16 column. He notes that, after looking over the *Technology Review* and thinking back to our days at Tech, he has concluded that the subjects today are way over his head (and ours, too) and that education has made wonderful advances in the last 50 years. We had to admit, in writing back to Frank, that we had recently been loathe (or maybe afraid) to take on the job of judging the 7th and 8th grade exhibits in "math and physics" in a local school exhibition. And why? Because, and *Francis Stern* will agree with us, we think, there could have been a cute little exhibit or two in "new math" and we might not know how to judge its truth or excellence. Now what would Professors Woods and Bailey say if they were to hear that one? Or even Professor Edwin B. Wilson, who in our freshman math course described a "cusp" as "something that would hurt worse to sit on than any triangle you could conceive of!"

Still in California, this time in Palm Springs, we have Francis Stern, on March 1, telling us of troubles with the heavy rains out there. He writes: "Now, what have I been doing? Trying to golf, between rain storms, when the mud is shoveled off the course. Tuesday, tried to go into Los Angeles to spend three days with my daughter. We started in spite of light rain but 30 miles out, in a downpour, we were stopped by police and rerouted back! A mud slide had covered the main highway, and as all other roads east and west were closed we got back to Palm Springs, which by then was completely isolated for over 24 hours. We managed to get in on Wednesday when a single lane had been dug out of the slide! Beyond, a small village, Yucaipa, was buried in a foot or more of water, horses standing in fields up to their knees in mud and water, and a foot or more of water covering the ground floor of every home. After 15 minutes on a pay phone, I got the operator to let my daughter know we couldn't get through. Finally got back here, the worst drive in years, as the wipers on my car wouldn't clear the water. Four inches fell in five hours!" In a different vein, Francis then said: "Saw the Royal Shakespeare Company in Los Angeles give *Doctor Faustus.* The most perfect theatre I have ever seen. They flew here from London. I don't think they go to New York but will be in New Haven in May. Try to go."

Our representative in Sun City, Ariz., is *George Waymouth,* formerly of Concord, N.H. In late March he wrote: "Since moving out here almost two years ago there has not been too much to report. Outside of visiting our daughter in Berkeley, Calif., we have had the usual tasks incidental to settling on foreign soil; finding where things are, making new friends, etc. Our arthritis is certainly a good alibi for more reading and less activity. I suspect we tend to use it more than is good for us." As noted among our 50th reunion histories, George was chief engineer in sugar factories (operating) in Puerto Rico five years, and in Santa Domingo seven years. Later he was mechanical engineer, Maintenance Division, U.S. Naval Torpedo Station, Newport, R.I., and still later Engineer, Bridge Design and Building Construction, N.H. Department of Public Works and Highways, Concord, N.H.

Next from Lubbock, Texas, we have a nice message from *James Murdough* who was the head of the Department of Civil Engineering, Texas Technological College, from October 1925 to May 1962, and is now retired as Professor of Civil Engineering, Emeritus. He writes: "Although I am on the 'emeriti list' our interests are still with our Texas Tech University, with the activities of the music department, of our athletic teams as well as of the engineering school. Texas Tech has grown from an enrollment of about 800 in 1925 when we came here to over 18,000. Lubbock has also grown from a population of say 10,000 to now over 170,000 so we are finding it a very fine place for retirement. Regards to friends among our classmates."

Cy and Gyps *Guething* reported things "beautiful" as they returned to Birmingham, Mich., from their winter weeks in Florida, but "much colder" than Cy likes. "Very little snow here this winter. It is 10° this morning (March 11) and we have another flurry. Because of the late date of the reunion, we are planning to attend and then remain in Chatham for another week or so before proceeding to Boothbay Harbor for the summer—all God willing."

Lee and Katy *Jones* of Elma, N.Y., had a couple of weeks on the west coast of Florida just before spring officially came around. Lee notes: "Some sun, lots of wind, and the natives allowed as how October was a lovely month there. We played a little shuffleboard and quite a bit of bridge so had a good time. Supporting *Emery Kemp's* doctor [reported in an earlier issue, Sec.] we ran into a couple in Venice who live in New England and have been driving to Florida every winter, but from now on they are only going every other year so they can afford to fly down and rent a car. The husband won't drive down and back bumper to bumper again. Hope to see you in 1971."

And from Phoenixville, Pa., friendly words come from *Ted Parsons*: "Happy is the people which has no history! There is so little of interest in my quiet backwater of life that I am in a dither for items to put

down on paper. We have lived here for the last three years to be near our daughter, her husband, and their children and have found it to be most rewarding. As born New Englanders, we have surprised ourselves by our genuine happiness in this area, in every condition of our present life and in our appreciation of the blessings which are ours therein. On the other side of the picture which we try not to look at, neither of us is in robust health and we are therefore limited in our activities to a great degree. Reunions, group interests and such-like, are beyond us if physical energy is a required feature, or setting up dated joining in advance, which may have to be cancelled at short notice. Hobbies? Well, there is a good public library in town and a game of chess now and then, with pistol shooting at the local Gun Club, plus reloading of ammo take up about all the spare time, with due allowance for rest periods and duties as are within my capability range."

Feeding and care of astronauts

A clipping from the February 2, 1969, issue of the Boston *Sunday Globe* will be of interest to '16ers. It relates to the topic: "Bedford-built filter helps feed, protect astronauts." It reads in part: ". . . all Apollo astronauts are protected from potential microscopic bugs in water used for drinking and for hydrating their dehydrated food through a product . . . brought to a high degree of efficiency by the Millipore Corp. of Bedford. . . . Heading this development team was Jack Bush, son of scientist Vannevar Bush. In 1953, he formally organized the Millipore Filter Corp. to commercially exploit the product. . . . Bush is the president of this concern which, through extraordinary vision and creative ability has developed this simple disc of cellulosic material to a point where it has brought about revolutionary changes in scientific and industrial fields. . . . This simple-appearing Millipore filter is fashioned of pure cellulose material, unaffected by most solvents, yet at the same time the most porous and quantitively retentive sub-microscope filtering medium known."

Cancer pioneer not shushed now

In Bridgeport, Conn., *Dick Berger* still carries on his work as president of Cancer Prevention, Inc., a non-profit, tax-exempt organization for research and publicity on the probable causes and prevention of cancer. His pioneer work, dating back to the 1930's, was long subject to opposition and shushing. But the January 12, 1964 issue of the Bridgeport *Sunday Herald* had this to say: "Proved Correct, Richard Berger Still Fights On: Bridgeport's Richard Berger used to be called a 'crackpot' but today he is widely acclaimed as a 'pioneer.' Berger acquired his 'crackpot' tag almost 20 years ago when he began issuing warnings that cigarette smoking produces cancer. Now he is regarded as one ahead of his time who has been vindicated by scientists who have just caught up with him. Final confirmation of Berger's long-standing claim regarding the relationship between cancer and smoking was released yesterday by a Government sponsored panel of scientists." Now, in a new release, probably his best, Dick notes: "Carcinogenic thermic products such as soot, tar, or smoke are formed when the following foodstuffs are heated sufficiently—animal fats, vegetable oil, margarine, shortening (such as in pastry and nearly all bread except some diet bread) and coffee (tars are formed when coffee beans are roasted) during the baking, roasting, broiling, charcoal broiling, and smoking of foodstuffs." To avoid cancer, he says: "Use moderation everywhere and abstain whenever possible from all intake and contact with known carcinogens such as tars, thermic products, X-radiation, intense fluorescent lighting, intense television radiation, polluted air, the artificial, chemical food additives (especially coloring, flavoring and preservative), and don't smoke." Send a stamped return-address envelope for a copy of his new release, No. H9 to 1928 North Ave., Bridgeport, 06604.

Our sun-loving Assistant Secretary, *Peb Stone,* and Dolly (as now reported by your secretary) are very much taken with a particular spot in the Caribbean, so taken, in fact, that each March they must go back and resample the joys of being there. This March was no exception—the place is Young Island, St. Vincent, W.I.—see how far away it is, in your atlas. Peb's picture post card says the enchanting beach at Young Island is rimmed with tropical plants and trees, only 600 feet off the south shore of St. Vincent, and a home-made arrow "marks our cottage among the trees." This year the trip down was "quite hectic as the snow storm delayed departure two hours which resulted in a missed connection in Barbados. There were 38 people who missed connections, hence a scramble for accommodations in Barbados. Fortunately our host at Young Island was on the plane from New York—he rushed around and chartered a twin motored plane (like Ralph's) and got some seven of his guests over to his island that night. A bit scary, however, as we landed a bit after sunset and there were no lights on the runway at St. Vincent's. The airplane people sent out an S.O.S. to the taxis and about 30 of them assembled at the side of the runway with their head lights on and this made it possible to land. It was about a 40 minute flight from Barbados among low-flying clouds all the way. One must be prepared for all emergencies when traveling in the Caribbean." Further, from Peb: "Young Island is as delightful as ever and I have to keep my torso covered up to avoid sunburn. The beach and reefs are good for snorkeling but I'm not attempting scuba diving this year. Beautiful yachts, six now, just off the beach—a sight for sore eyes, though mine are O.K." Then Peb and Dolly came home to go through that awful three-weeks pile of mail and papers!

Deceased

Just before these notes for June went up to Cambridge, we received word of two more '16ers who have passed on: *L. Stuart Wright* of Dayton, Ohio, and *Edwin Long* of San Francisco. We hope to have more information later.

We now come to the end of the class notes for the time being and close with the hope to see you soon at the 53rd, at the Chatham Bars Inn in Chatham, Cape Cod—for a luncheon at least, for the banquet Saturday night (better!), for a full day, or, best of all, for the full two days, June 13 to 15. And as before, we urge you to write a little but write often to keep your willing-to-work secretaries busy and smiling.—*Harold F. Dodge,* Secretary, 96 Briarcliff Rd., Mountain Lakes, N.J. 07046; *Leonard Stone,* Assistant Secretary, 34-16 85th St., Jackson Heights, N.Y. 11372

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Correction and apology—in the March notes our Rear Admiral Sullivan's competitor in raiding Las Vegas, should have read, Irving B. McDaniel, '16.

Make your plans to attend our 52nd Reunion next October 8 and 9. There is a strong sentiment for Sturbridge again although some feel that a change to another convenient place would be good. Locations are being investigated and you will be informed. So mark your calendar now.

Richard T. Lyons comments, "Since the 50th reunion, Sammie and I have been occupied with a normally busy routine; with no unusual events excepting an auto trip this year visiting the popular sight seeing spots and interesting mining areas of New Mexico and Arizona."

Phil Cristal—"I retired in October 1967 as trust investment officer of the Merchants National Bank of Manchester, N.H. This was my second retirement as I left Northwestern Mutual of Milwaukee in early 1959. Since October 1967, my new venture as an investment counselor has come along slowly but surely. Besides, I am having fun." Wonder if Phil and *Win Swain* are comparing notes!

Ken Lane and Betty motored over to Naples, Fla., from their east coast retreat and it was good to learn that Ken got *Ray Stevens* back into playing golf. The trip was marred by someone with taking ways, who broke into the car and relieved them of a car-full of clothes, but apparently not the golf bag. Sorry to learn this, better luck next time. How about the score card? *Ken Bell* and Vera were also checking in on the Stevens enroute to some undeveloped country which needs Ken's services to teach them how to tan hides, more to follow we hope.

Supplementing February notes regarding Brick's (*Atwood P. Dunham*'s) one-man show of his painting prowess: "Old home town friends in Brockton, Mass., having seen some of my paintings asked if they could fill in one month in a regular schedule of Art Shows at their church. My wife accepted, so I have a One Man Show of 35 pictures about evenly divided between pencil, charcoal sketches and



Ruthie and William Dennen, '17, greeting Fiesta guests at the Mexico City airport. (Photo courtesy of W. G. Henderson, '33.)



Remember When? The late "Dutch," Francis V. Du Pont, '17, on reunion at Wentworth-by-the-Sea, June 1952 or 1957?

oil paintings. For the opening an Open House was held on October 6, when much to my surprise 150 people appeared including many old friends. It was a heart warming experience for me. The title of the show 'An Occasional Painter' denotes the merits of it's quality." Both Brick and *Howard Melvin* rate an honorable mention for their excellent cooperation in soliciting news items, Brick with the half of the class residing in Massachusetts, and Howard covering the Pacific coast.

A.I.A. gives highest honor

William Wilson Wurster, F.A.I.A., will receive the A.I.A.'s highest honor, the gold medal at the Institute's 101st convention in Chicago, June 22 to 26. "The 73 year old Wurster is a principal in the San Francisco firm of Wurster, Bernardi & Emmons. His work is associated with an honest use of materials and straight forward solutions. Though it is sometime linked with Bay Area regionalism, Wurster once said that regionalism does not exist for its own sake, but only if it fits the problem. A native of Stockton, California, Wurster ran his own office before entering into partnership in 1943 with Theodore Bernardi and Donn Emmons. He is dean emeritus of the College of Environmental Design, University of California. A fellow of the A.I.A., the American Academy of Arts and Sciences, and the Royal Academy of Fine Arts in Denmark, Mr. Wurster also is an Academician of the National Academy of Design, Affiliate of the American Institute of Planners, member of the Akademie der Kunste of Germany, and corresponding member of the Royal Institute of British Architects. He has among his awards an Honorary Doctor of Laws degree from the University of California in 1964, Distinguished Service Citation from the California Council, Man of the Year Achievement Award from the Building Industry Conference Board, Citation for Distinguished Contributions to the Field of Architecture and several design awards." *Jim Flaherty* comments further, "From the present issue of the *A.I.A. Journal,* Wurster chaired the Architects Jury that awarded the first prize and winning design for Boston's new City Hall."

Noah W. Gokey, "I am delighted the widows have done so well with their Nelson Chase memorial and will keep my eye on the next issue of the *Review* for something about it. In recent years I never seem to get up to New York so will have to forego the class luncheons at the Chemists' Club, but thanks anyway for informing me about them. We came down to Ormond Beach Manor, Fla., the first week in January and will remain until the middle of March since I am deeply involved with lawn bowling for the Peabody Lawn Bowling Club of Daytona Beach. My permanent address is 1320 East Bay Shore Drive, Virginia Beach, Va. 23451."

Ed Pollard, via his wife Ruth: "Ed was very pleased to think that you remembered him. Unfortunately he is not able to write, and all he can do is watch TV which he enjoys. The stroke in September, 1966, paralized his left side completely and took away his speech. Seems such a shame that this catastrophe should have hit Ed as he was surely enjoying his retirement. He loved outside garden work, enjoyed his three grandsons and really asked so little of life."

Alfred Pierce, In a letter of March 17 to Howard Melvin: "You asked to have this material sent to you instead of Dix as he is away on a Caribbean cruise. It just happens that my wife, Irene, and I have just returned from a 28-day cruise through the Caribbean leaving from and returning to Los Angeles. We cruised down the west coast and through the Panama Canal stopping at 13 ports in Mexico, Panama, Venezuela, Columbia, Trinidad, Grenada, Barbados, Curacao, Aruba, Martinique, and the Virgin Islands. We were astonished when we visited Caracas, Venezuela to find a flourishing modern City with many high rise buildings, luxury hotels, freeways, and parkways through the City, plus a traffic jam the likes of which we have never encountered before, not excepting New York, Mexico City and Los Angeles. We had thought of Caracas an an antiquated relic from the days of the Spanish conquest. Cartagena, Columbia is more in this latter class, but is now on the way to modernity. Each Island in Caribbean is different and has its own culture and physical features." Incidentally Vi and I did pretty much the same itinerary in the Caribbean in 22 days from the East Coast on the *Bergensfjord* touching 12 ports including Port Everglades, Fla. It was a very interesting trip, seeing the changes from previous visits, but with a port of call a day, not very restful!

Deceased

William Warren Rausch passed away December 9, 1968. He resided at Buffington Hill Road, Worthington, Mass. Quoting from the 30th Anniversary report:

"Engaged in construction industry Stone & Webster from drafting room to assistant superintendent. Construction manager, George A. Fuller Co., New England branch manager Boyle-Robertson Company, 1924 to 1929; New England District Director, P.W.A. Housing Division to 1936; President Arlmont Homes to 1937; President Holt-Fairchild Co. to 1947; President Anchorage Homes, Inc.; Pioneered the pre-fabrication of homes; directed fabrication and erection seven defense housing contracts, including the Anchorage project for Navy at Newport, R.I., which was pronounced the outstanding project of the nation. Previously had directed the construction of $50,000,000 in large industrial and hotel buildings."

Rear Admiral *Ernest M. Pace, Jr.,* died March 6, 1969. We are indebted to Mrs. Pace, Jr., of 337 Mansfield Ave., Los Angeles, Calif. 90036, for the memorial notice of services held at the Church of the Flowers in Forest Lawn Memorial Park, Glendale, Calif. Interment was at Calvert, Texas, place of his birth. From the 30th Anniversary report:

"My contacts with M.I.T. graduates during my Naval Service have been many and various. Their contribution to the waging and winning of this last war was outstanding and augurs well for the future influence of the Institute in the welfare of the country and of the world."

Willard E. Bonnell, passed away November 2, 1968; his address was R.F.D. 1, Orleans, Mass. 02653.

A. E. Tuttle, supplementing Mrs. Tuttle's note in the May issue of the *Review*: ". . . poor health permits only a contemplative life."

Henry E. Strout (Tubby)—"Ordinarily Tubby is a real cooperative guy, but he turned us down on information of his activities as vice president of a businessmens' club of about 240 members in his Osterville area of Cape Cod. Tubby arranges for speakers at the monthly luncheon meetings, and gets some good ones." We surely could use you Tubby at the '16-'17 New York City luncheons. Al Lunn was Tubby's guest for one of last summers meetings and found it most interesting.

New addresses

Harold H. Perry, 777 West State St., Apt. 1-H, Trenton, N.J. 08618. *Walter C. Wood* (Jack), 3639 Charles St., San Diego, Calif., 92106.—*C. Dix Proctor,* Secretary, P. O. Box 336, Lincoln Park, N.J. 07035; *Stanley C. Dunning,* Assistant Secretary, 6 Jason St., Arlington, Mass. 02174

My work as the writer of these notes makes me think more of what has happened to us in the past half century than I used to—and perhaps more than you do. It seems to me that we were greatly compartmentized in undergraduate days; we were close to others in our courses but enjoyed limited contacts with the rest of the students. Remember there were no dormitories, no real campus, many of us were commuters to the suburbs of Boston. There were quite a few fraternities which added a social flavor for those who were initiates. Furthermore, World War I came along and nearly all of us were enlisted in it long before completing our regular four years. Senior Week with all the social activities and graduation exercises went by default.

It is interesting and a great source of satisfaction to me to note that class reunion activities have bridged the compartments. Many of you whom I never met from 1914 to 1918, I count as dear friends and our wives have been the catalysts to cement these friendships.

These musings bring to mind Dorothy and *Ed Rossman* who travel each winter from Paris Hill, Maine to California to visit their son and his family. We just received word that Ed was felled by virus in Tucson, Arizona and is seriously ill. He is, however, holding his own according to latest reports and will be moved to San Francisco shortly for recuperation near his family. Our prayers go out to Dorothy and Ed for his speedy recovery.

Your secretary was in New York recently as a delegate to a Technological Conference hosted by the Technion (the M.I.T. of Israel). Amongst others present was *Nat Krass* who had returned recently from a month-long visit with his son in California. I acknowledge a note from *Len Levine* enclosing a newspaper photograph of the Rogers Building being wrecked some years ago to make way for the new New England Mutual Life Insurance Building.

The enclosed letter from *Al Walker* will be of interest to all of you. "I should have written you ere this to add my expression of appreciation for the fine job you are doing with the Class Review notes. Was most pleasantly surprised to read the account of my activities in the February issue, but somewhat puzzled as to how you obtained the material. Perhaps I did send it to Alexander last year, or maybe to you, and had completely forgotten about it.

"Also in the February notes was an account of the 50th wedding anniversary of Elmer L. Joslin. Well, we leave here on Saturday, March 29, to visit our son in Houston, Texas and to celebrate our 50th anniversary with the family! Charles M. Walker, our son, was in the class of '49 at M.I.T. and he also took chemical engineering, after returning from a two year stint in the army of occupation in Germany. He was here visiting us for two days on business, which was for some years designing oil refineries for the C. F. Braun Co. Now he is in their sales organization which has offices in Houston.

"While visiting with us he told me he had sent in a check to the Warren K. Lewis Memorial Fund. I had sent in my check to this some time ago, and then realized a few days later that it would have been more appropriate if my son and I had sent in a joint contribution. It is rare indeed that two generations of one family can profit so much from the educational influence of one teacher. The training which both Charles and I obtained from "Doc" Lewis was basically responsible for worthwhile accomplishments of both of us. I believe, in all seriousness, that my son is doing an outstanding job in his field. I wonder, in view of the fact that you live so close to the Institute, if it would be possible for you to find out who is managing the W. K. Lewis Fund, and see if our two contributions could be recorded as a joint one of father and son? Just a few years ago "Doc" Lewis gave a talk before the M.I.T. Club of New Jersey. At that meeting I presented him with one of my synthetic quartz crystals and acknowledged the help I got from him in the success of this engineering accomplishment.

"Also I saw in some of your recent notes a reference to Royal Barry Wills. Although I knew him only slightly, recently as program chairman for the Thursday Afternoon Club of Central Presbyterian Church in Summit, N.J., I helped arrange a talk by Mrs. M. V. Keihl and her husband on 'Historic Houses.' She gave an excellent talk, and in the course of it showed pictures of several houses built or designed by Wills, and spoke very highly of his ability. It was quite a thrill to me, realizing he was a classmate, and got his training in architecture at the Institute.

"Just finished reading a new book: *The DNA Helix,* by Watson. Here and there in this book were accounts of the authors' long walks over the English countryside out of Cambridge, England. It so much reminded me that in the spring of 1918, Alden Nute, then an instructor in chemistry at M.I.T., used to go for long walks with me to Concord, Lexington and other New England landmarks near Cambridge, Mass. Walking then was not the dangerous pastime it is now, and it was a fine way to get exercise. I got a lot of such exercise that year, for nearly every afternoon after school I walked over to the "Y" in Boston, on Mass. Ave., to go swimming and fancy diving. The man in charge of the pool there used to make suggestions regarding my diving form, and one day he discovered that I was a student at Tech. He promptly put me on the swimming team, because he was the unofficial coach. I protested that I had never had any formal training in diving, but he overruled me. As a result, much to my surprise, I got third place in diving in the Intercollegiates at Princeton that year, and my girl, whom I married in 1919, came up from Washington where she was working, to see the meet. Regards, and keep up the good work."

We are grateful to *Don Goss* for his reply to my plea for autobiographies. Please send me yours. "Your note came at the height of the downpour and I was just about to shut up shop, but now I have a challenge to assemble some data on my doings and shoot them to you so you may glean any items that you think might interest any of my classmates.

"After getting into W.W. I too late to be effective and winding up in Texas, I scrounged a job with Cram and Ferguson for a spell and later, with Guy Lowell, which lasted 12 years and during which I rounded out my training as an architect —enough to start my own show in 1931.

"Dull it was for a long time, it being right smack in the depression, but later picked up until W.W. II, when I spent the next three years with Stone & Webster. Back again to my own digs and from then on a fairly steady parade of houses and alterations. Shared office space with Louis Ross who did so much for the University of Massachusetts until he retired and I made a break from Boston and came down here to Swampscott, my home town and where 90 per cent of my practice has been. Been here since 1965 and like the the move very much.

"So much for the old profesh. Family-wise I have been very lucky having 2 sons and 2 daughters—all grown now and with families of their own. Our first daughter teaches at the Tower School in Marblehead and is Assistant to the Headmaster.

"Our first son is an inventor and is employed by good firms to figure out a better and cheaper way of doing things. Son number two is a professor of biology at Brown, specializing in the growth and regeneration field. Daughter number 2 is married to a lawyer in Marshfield Wisc. and loves the country life, with square dancing, pottery and oil painting as her hobby. Combined they have given us 11 grandchildren, all well and healthy, and at this juncture range in age from 21 down to 4.

"My sweet wife died in 1965 and I'm with my oldest daughter. She has three girls, so with two female dogs, I have the only bass voice in the place!

"Hobbies have been Boy Scout work from about 1940 and the fun of doing water-color paintings when things get slack in the office. Travel some, but not much. England last year and every so often to Bermuda. Big trip was to Hawaii in 1963 —the culmination of our travel desires. Love that place!

"So what else is there? I'm reasonably healthy, have a daily drink to keep my fluids up, sleep well and have many future plans. You seem to have kept up your zip, Max, so I guess we're both lucky, counting everything."

Land of the Midnight Sun
We continue with the concluding installment of *Tom Brosnahan*'s travelogue.

"Iceland was discovered by the Vikings in the year 860. The early settlers were Scandinavians and a few Celts from the British Isles. In 1930 Parliament was established for the Icelandic Commonwealth. Although the nation was under the control of Norway and later Denmark in succeeding centuries, Parliament has continued and still exists making it the oldest government institution on earth. In 1918 after the first World War, it was recognized as a sovereign state, and in 1944 it became an independent Republic.

"The name 'Iceland' and its geographical location have created some misunderstanding in regard to the nature of the country and its climate. It is a volcanic island, approximately 190 miles from North to South and 300 from East to West. The warm waters of the Gulf Stream moderate the temperature to an average of about 52 degrees in July and 30 in January, which compares with an average mean in New York for the month of January of 33.

"There are a number of glaciers which are tremendous masses of ice and snow. The largest covers an area of 3240 square miles. Under some of these glaciers, volcanic craters exist. When they erupt there is an unusual and conflicting combination of fire and ice.

"We have reservations for a non-stop flight on Flugfelag or Icelandic Airlines from Bergen to Reykjavik, a distance of 917 miles. For some reason this flight is canceled and provision is made for us to fly southeast to Copenhagen which is in the opposite direction, then west to Glasgow, Scotland and northwest to Reykjavik, a total distance of 1931 miles.

"There is no extra fare in taking the longer trip and we have an opportunity to visit the airports at Copenhagen and Glasgow where merchandise and liquors from various parts of the world are on sale at very reasonable prices. As we approach Glasgow there is a most unusual sunset. The sky is a bright flaming red for nearly an hour.

"We arrive at Keflavik Airport, Iceland, in the early hours of the morning after our extended flight over the North Atlantic Ocean We learn to our dismay that the airline neglected to transfer our luggage when we were assigned to another plane. A number of other passengers are in the same predicament, but we all accept the situation as one of the risks or inconveniences of travel. After a long, slow bus ride we reach our hotel in Reykjavik."

Keep sending me notes of what you are doing—where you are travelling—your hobbies. I list the following new addresses: *Theodore A. Pierson, Jr.,* 1234 Old Nassau Rd., Princeton, N.J. 08540; *Charles E. Dimock,* 97 North Policy St., Salem, N.H. 03079; *Saxton W. Fletcher,* Cloverly Farm, Greenfield, N.H. 03647; *Collier Cobb, Jr.,* Box 310 Chapel Hill, N.C. 27514.—*Max Seltzer,* Secretary, 87 Ivy St., Brookline, Mass. 02146

19

Dean Webster had a trip to California and visited Charlie Chayne at his beautiful Pebble Beach home. . . . A letter from *Milton A. Loucks* states that he and his wife will be at our 50th reunion. His son will be celebrating his 25th at the same time. Milt had a three week trip covering South America, followed by a trip to Bermuda in May. . . . *Don Way, Will Langille,* your secretary and Panos Spiliakos met in New Jersey April 11, to review the 50th reunion. Langille's last news release of April 1, lists 45 classmates, 36 wives, or 81 already definitely coming to reunion. Everyone estimates that over 100 will attend. Be sure to follow Langille's the "things you should do now," six items including sending for reservations at Chatham Bars Inn, McCormack Hall, card to Lehmann on Commencement procession and reserved seat, Monday Luncheon and dinner reservations, and write Moody if you need transportation. It would be nice if those definitely coming would recruit others who haven't decided definitely as yet. See you all there.—*Eugene R. Smoley,* Secretary, 30 School Lane, Scarsdale, N.Y. 10583

20

Word has just been received of the death several months ago of *Warren L.* ("Bud") *Cofren.* Bud had retired to Winter Haven Fla., and had been in poor health for some time. Not long ago he remarried and is survived by his widow, Rose. Noted for his friendly, outgoing personality, Bud had a host of friends among his classmates and his loss will be keenly felt.

The death of another prominent classmate, *Elmer P. Grismer,* has just been brought to my attention. Elmer had retired and was living at 3217 Golden Rain Road, Walnut Creek, Calif. Before that he resided in Chicago where he was president and treasurer of Drill Rod & Tools, Inc. The sympathy of his many friends in the Class is extended to his widow.

Welcome word has been received from *Harland A.* ("Dolly") *Gray* who reports that he is keeping occupied in his retirement by becoming a registered Florida

Real Estate Broker associated with Arvida Corp., in Sarasota. This is not such a switch as might appear since Dolly was long associated with the Aluminium Company of America whose former board chairman was Arthur Vining Davis who founded Arvida Crop. At present the enterprise is controlled by Penn-Central Railroad.

Of particular interest and gratification to his classmates is Dolly's promise to attend the 50th, now only a year away! It's none too soon for you who are reading these notes to buck up your hard-working Reunion Committee by dropping a line or a postcard to the undersigned or to Chairman Edwin D. Ryer, 233 Washington St., Duxbury, Mass., telling us you expect to be among those present at this greatest of all reunions.

A fine letter from *Arthur Merriman* makes courteous reference to an error in the class news in which I mentioned that he was building a new home on Cape Cod. Arthur points out that he is indeed building a new home but that it is "Cape Cod design" and is located at 2314 Lamberton Road, Cleveland Heights, Ohio. Art goes on to say that as a result of seeing *Carleton Alexander*'s name in this column, and his address in Willoughby, Ohio, he got in touch with Carleton and arranged for a meeting when Carleton gets back from Florida, at which time they plan to talk over old times. Best of all is the assurance that Arthur and Mrs. Merriman are planning to be at the 50th and are looking forward to this great event.—*Harold Bugbee,* Secretary, 21 Everell Road, Winchester, Mass. 01890

21

The '21 wanderers are back from our third interim reunion in Mexico and, so far as we know, all enjoyed the excellent 21st annual Fiesta of the M.I.T. Club of Mexico City, as well as supplemental travel in our sister republic. Al's sudden last-minute illness prevented Emma and Chairman *Al Lloyd* of the Interim Reunion Committee from making the trip. He has recovered from the flu but left us in some confusion when, on our return, there was no one home in Westerly, R.I. A note written in London, England, and received from Emma as these words are written, says they took an unanticipated trip with daughter Barbara and her husband, Dr. Hayes, to Zurich, then to London and back to Geneva before returning in mid-April. Regretfully, Helen and Class Prexy *Ray St. Laurent* had to go to Boston for his hip operation; he would like to hear from you at Phillips House, Massachusetts General Hospital. *Dana Kepner* had been in the hospital and was told to avoid exertion, so he and Beryl went to the West Coast to look up Helen and *Ed Farrand* and Marge and *Jack Kendall.* Clara and *Asher Cohen* had to cancel on doctor's orders. The group that is too young to retire—Kim and *Don Morse,* Olive and *Ollie Bardes,* Elizabeth and *John Barriger,* Rigi and *Saul Silverstein* and the *John McCloskeys*—ran into other commitments which just couldn't be postponed. Those of the Class who did attend the Fiesta included Betty and *Howard Johnson,* Cambridge; Anne and *Wally Adams,* Middletown, Ohio; Mary and *Bob Barker,* Narbeth, Pa. (Bob spent years with '21 but is listed as '24); Maxine and Class Secretary *Cac Clarke,* Brielle, N.J.; Assistant

Class Secretary *Sumner Hayward,* Ridgewood, N.J.; Elma and *John Mattson,* Winthrop, Mass.; Helen and Class Photohistorian *Bob Miller,* McLean, Va., and Maria Helena and *Viviano Valdes,* Mexico, D.F.

The *Adams* and *Clarke* couples flew down a week early. From the airport we were driven directly to Cuernavaca to spend several days exploring the area. The three pools at the hotel, a pyramid, a waterfall, a nearby ancient town and several delightful meals amidst the riot of colors and birds in the flower garden at Las Mañanitas (where we saw Apollo 8 sail by one evening) filled the time until we all drove to Taxco to spend the balance of the week. Sightseeing here included a really high waterfall, silver mines, the famous Santa Prisca and numerous trips to the quaint shops on the flower-bedecked, steep, cobbled slopes of the picturesque town. The drive to Mexico was via the cave country, an apiary and the basket industries of Toluca, with a lunch stop at Mexico's newest plush spa and hot mineral springs—the ultra-modern hotel complex at Ixtapan de la Sal. In Mexico, we learned that María Luisa and Manuel Vallarta had to make a hurried trip to Vienna for his formal installation as the president of the International Atomic Energy Agency. We had a delightful dinner with Conchita Pearson.

Fiesta! Olé!

Just about all of the 135 visitors from outside Mexico went to the magnificent performance of the *Folklorico Ballet* in the Palace of Fine Arts on the eve of the Fiesta. Another 100 alumni and wives, resident south of the border, joined us next morning for the registration meeting at the University Club, where we all received inscribed miniature sombreros as name tags. Part of the group went to the huge modern Museum of Anthropology in Chapultepec Park and others to the beautiful adjoining Museum of Modern Art for conducted tours of the exceptional displays. At a sumptuous noon dinner at the University Club, welcome was extended to the visitors, the guests from Cambridge and especially to those from the Classes of '21, '22 and '23, who marked the occasion with interim reunions. Awards and presentations got under way when Clarence M. Cornish, '24, former local club president widely known as "Mr. M.I.T. of Mexico," performed his usual entertaining recognition of every alumnus present. The day concluded with an evening bus trip to the ancient city of the Indian gods at Teotihuacán for the stirring and impressive colored light and sound show staged around the vast area of the giant Sun and Moon pyramids.

Reliving the Olympics

Next day, busses took the visitors to Tula for an inspection of the enormous Toltec statues and monoliths atop one of the tall pyramids and the extensive excavations of an area once peopled by an early Mexican civilization. Climbing was steep and arduous and the sun was hot, but delicious box lunches and refreshments set the stage for a more leisurely visit on the return trip to the gorgeous sixteenth century convent at Tepotzotlan, now a museum of priceless art and unusual relics. That evening, Dr. *Howard W. Johnson,* President of M.I.T., gave a well received address on "Education for the New Technology," in the spacious auditorium of the Museum of Anthropology, open to the public. Saturday morning brought an unusual opportunity to examine the aesthetic and practical features of a number of the widely separated structures built especially for the 1968 Olympic Games. All were specially lighted and supplied with musical programs for the occasion. In addition, a large group of outstanding architects and city planners had been assembled from those who had taken part in envisioning and building the structures, so as to describe their features to our group and to answer questions. Local government officials, sports experts and athletic coaches were on hand to add to the description of past and current use of the buildings and their many unique details which led to the breaking of 31 per cent of previous world's records and 63 per cent of earlier Olympic records. Heading this group was Hector Velásquez, '51 chief of architecture and city planning of the Mexico Ministry of Public Works, who also was personally in charge of the entire design and construction of the Olympic Village. This project of 30 six and ten story buildings to house 10,000 athletes was built on desolate lava beds, landscaped and furnished with all manner of facilities for eating, entertainment, sports practice, meeting and cultural needs. The officials conducted us through the Sports Palace, Fencing Arena, Bicycle Velodrome, Handball Stadium, Swimming and Diving Pools and the Olympic Village. At the Olympic Pool, Felipe Muñoz, Mexican gold medal winner, demonstrated his amazing breast stroke.

Gay caballeros

Noontime brought a specially arranged *charreada* under the direction of Paul Gerard, '35, who also performed in the ring. Startling horsemanship, bulldogging wild steers, riding and lassoing wild horses by men and boys and precision formation riding by a bevy of costumed young girls was followed by native dancing groups and a fine *mariachi* band. The private club enjoys a specially designed complex of buildings for its membership of prominent business men who ride for pleasure and exercise. A delicious luncheon was served on the spacious patio. As always, the *pièce de resistance* of the Fiesta was the finale, the *Noche Mexicana* held that evening in the beautifully decorated gardens of the home of Don Federico and Mrs. Tamm in exclusive San Angel. From hot punch through countless Mexican delicacies and beverages, the visitors partook of a sumptuous repast interspersed with dancing and performances in authentic regional costumes by wives of Club members. Fireworks and demolishing the elusive *piñata* were high spots of the evening. The latter, a monster M.I.T. beaver in sombrero and torero outfit, eventually disintegrated from the effective blows of Betty Johnson and novelties for all poured out of the figure. An unscheduled event next day was a wonderful dinner, hosted by Luisa and Nish Cornish in the beautiful gardens of their home, for Cambridge visitors and class officers.

Seeing Mexico

The members of the Class of '21 all agreed we had a grand time helping the Fiesta in Mexico to become "of age." At this juncture we separated to head for various destinations. The *Adams* couple flew to the Yucatan to visit Mérida and the island of Cozumel. *Sumner Hayward* joined the *Millers* for stops in Cuernavaca and Taxco and then went to the art colony town of San Miguel de Allende, while Helen and Bob went on to Acapulco and then to Mexico to spend some time with their daughter, Kathleen, and her husband. The *Mattsons* and the *Clarkes* drove to Morelia for a few days, stopping for lunch at the lovely spa in San Jose Purua. Here the president of Mexico spends a few days a month in a villa on the grounds, overlooking a deep gorge fed by numerous waterfalls. Norman and Mrs. Tinkham, whom we met at the Villa Montana in Morelia, turned out to be Jamestown, N.Y., neighbors of Eddie and *George Gokey,* living in San Miguel, where we later visited them. Another surprise was meeting Bob and Mrs. Patterson; he was a former associate in the Northern Electric Co. Ltd., Montreal. Also among the guests were Bob and Frances Dietzold of Summit, N.J. He is M.I.T. '25 and she is the former Frances Clark, '22. A side trip to Lake Pátzxuaro and a motor launch tour to the island of Janitzio, where the Indian natives use butterfly nets and dugouts to fish for *pescado blanco,* was a high spot of our travels. With the *Mattsons,* we saw the valley of hot geysers on our way to Mexico's second largest city, Guadalajara. Here Elma and John left us to fly to Puerto Vallarta. In Guadalajara, we saw Killian V. R. Lansingh, '26, one-time member of the M.I.T. Radio Society, and his charming Mexican wife, who have a new home there. Bereft of '21 companions, we pushed on to the cultural and university center of Guanajuato. Next, we spent some time in San Miguel, where we talked to Mrs. Johnson by phone but, due to the illness of Colonel *John M. Johnson,* Course I, in our Class, they were unable to join us for dinner. After their many years in San Miguel, the Johnsons are well known in the area. Here we visited galleries and the famous *Instituto Allende.* During our final stop at La Mansion in the vicinity of Querétaro, we met retired Army officer Bob Osborn and Mrs. Osborn, La Jolla neighbors of Brig. Gen. *Ludson D. Worsham* of our Class. It was in Querétaro that the



W. T. Adams, '21



V. L. Valdés, '21

reign of Emperor Maximilian was ended and also whence we drove to Mexico to board a plane for New York and drive back to Brielle. For us, four weeks spent at altitudes of one to almost two miles, countless towns, the differing regions, eight of the Mexican states and the Federal District, 1,300 miles of surface travel (not including the vertical component!), the excellent warm, dry weather, and the good food, fun and fellowship are not soon to be forgotten!

Outstanding records

Manuel Sandoval Vallarta, world-renowned physicist on cosmic radiation and relativity, affectionately known as the "grand old man of Mexican science," is one of three commissioners heading the Mexican nuclear energy authority and now, as noted, president of the International Atomic Energy Agency, whose headquarters are in Vienna. A native of Mexico, D.F., where he prepared for M.I.T. at *Escuela Nacional Preparatoria,* Manuel was active as an undergraduate in the Electrical Engineering Society and the Latin-American Club, of which he was secretary. He was graduated with us in old Course XIV, then electrochemical engineering, and went on to obtain a doctorate in Course VIII. He was Professor of Physics at M.I.T. from 1923 to 1946. He holds honorary doctorates from the National University of Mexico, the University of Michoacan and the University of the Americas. He has also been a professor at both the National College and the National University of Mexico; a visiting professor at the University of Louvain, Belgium, and at the Tata Institute for Fundamental Research, India; the Pupin Lecturer at Columbia University; a quest of the Institute for Advanced Study, Princeton, and an honorary professor of the University of San Andres, Bolivia. A Guggenheim Fellow, he served on the Educational Foundation for the Relief of Belgium, as a research associate of the Carnegie Institution, and as general director of the National Polytechnic Institute. He was also undersecretary of education for the Republic of Mexico, one-time editor of both the Journal of Mathematics and Physics and the Journal of Geophysical Research, and he has authored many scientific papers. In 1946, he became Mexico's representative and the chairman of the U.N. Atomic Energy Commission and also the Mexican delegate to U.N.E.S.C.O. He was named a commissioner of the Mexican Nuclear Energy Commission in 1956, the governor for Mexico of the International Atomic Energy Agency in 1966, and president of the Agency in 1968. He is also a member of the International Commission on Weights and Measures, Sevres, and the chairman of the scientific council, International Center for Theoretical Physics, Trieste. Val is the recipient of both the Camacho Prize and the National Prize of Mexico. He is a fellow and former president of the Mexican Academy of Science; a fellow of the American Physical Society and of the American Academy of Arts and Sciences, and a corresponding fellow of the Academy of Physics and Natural Sciences of Peru. Other memberships include the American Mathematical Society, Philosophical Society, Canadian Association of Physicists, Physics Society of Japan, Netherlands Physical Society, Mexican Physical Society, the Pontifical Academy of Science, and the M.I.T. Club of Mexico City. Manuel and his charming wife, María Luisa, Trace their family lineage back through a long line of Mexican patriots who won honors and recognition for their contributions to Mexico's independence. Manuel's address is Insurgentes Sur 1079—Tercer Piso, Mexico 18, D.F.

Viviano L. Valdés, Insurgentes Sur 1208, Mexico 12, D.F., is another prominent Mexican member of the Class of '21. A native of Monterrey, he attended the *Colegio Civil* there, the Technische Hoschschule in Vienna, and Notre Dam. He was graduated with us in Course I. At M.I.T., Viviano was active in the Latin-American Club and, variously, its secretary, vice president and president; the Catholic Club and its board of directors; the Cosmopolitan Club and the Civil Engineering Society. He is a member of Phi Lambda Alpha. Following civil engineering consulting work in Mexico, he was general manager of Crédito Constructor, S.A., a contracting and real estate firm. In 1932, he became associated with Ladrillera Monterrey, S.A., a tile manufacturing company, and has for years been a member of its board of directors, specializing in financing and sales. He is a director of a number of other firms, including Siporex de Mexico, S.A., Banco de Comercio de Monterrey, S.A., Financiera de Nuevo León, S.A., and Industria Financiera Berel, S.A. Viviano is a member and former officer of the M.I.T. Club of Mexico City. Other memberships include the Sociedad de Ingenieros y Arquitectos de Mexico, the Club Sembradores de Amistad and the Unión Social de emprasarios Mexicanos. He and María Helena have two married daughters and a married son, with another son in law school at the University of Mexico. There are eight grandchildren. We all remember with pleasure the visit which Viviano, Maria Helena and their daughter, Maria del Carmen paid to the 40th Reunion in Plymouth. He says that he and Maria Helena will definitely be present at the 50th in 1971!

Anne and *Wallace T. Adams,* 2606 Fleming Rd., Middletown, Ohio 45042, are among the several couples who are "veterans" of our reunions in Mexico. A native of Lynn, Mass., where he attended Lynn Classical High School, Wally was graduated with us in Course I. Active in the Civil Engineering Society at the Institute and a member of its executive committee, he was also in the Musical Clubs, on the track team and a member of the Technology Athletic Club. His stories of summer camp at East Machias are legion. Wally served as an instructor on the staff of the M.I.T. Department of Civil Engineering for a year before he became a division engineer with the Division of Highways, State of Illinois. He later joined the Armco Steel Co., Middletown, Ohio, where he has been responsible for the development and wide range of products from culverts and standardization of specifications for a piping to highway guard rails. He retired in 1964 and has continued in the consulting field when not enjoying a round at the Wildwood Golf Club or indulging in fishing, photography or building sophisticated color television sets. He is chairman of the highway committee of the Chamber of Commerce and director of its safety council; a member of the Ohio Highway Safety Committee and the Ohio, Indiana and Kentucky Transportation Study Commsision. He has long been active in the Boy Scouts of America and has been awarded the highest honor, the Silver Beaver, by the Miami Council which he serves as vice president of the executive board and member of the camp committee. His memberships include the American Society of Civil Engineers, the National Society of Professional Engineers and the Ohio Society of Professional Engineers, of which he is vice president. He is also a junior warden of the Episcopal Church of Middletown, where he regularly sees *Arthur R. Harvey.* Anne, who hails from our home state of North Carolina, is an accomplished artist. She and Wally have two sons and a daughter, all married. Richard attended Texas A. and M. and the University of Cincinnati; Joyce, the University of Illinois, and David, Ohio University and the University of Michigan. There are twelve grandchildren.

First class mail

Eric Smith, 78 Dufferin Rd., Montreal 254, P.Q., wrote to send his regards to the group in Mexico. His sister, Kathleen, from Saskatoon spent several months with him and they visited a nephew in Ottawa. Though "retired," he keeps tabs on Fraser-Brace Engineering Co. Ltd., of which he is chairman. We hope to see Eric in Brielle this summer. . . . *Ralph. M. Shaw, Jr.,* 608 Riverbank, Beverly, N.J. 08010, writes that he and Madeline have been "hob nobbing with the aristocracy" at Caneel Bay Plantation, Virgin Islands National Park, St. John, U.S.V.I., and sends their regards to friends in Mexico. The Philadelphia firm, Pedrick Tool and Machine Co., specialists in fabricating bending equipment of which Rufe is president, has just celebrated its 94th birthday. . . . Graciela and *Helier Rodríguez,* Apt. 10-C, 4015 Bayshore Blvd., Tampa, Fla. 33611, report a visit

and luncheon with Betty and *Dug Jackson.* . . . *Jack Kendall* has been most faithful in phoning *Ray St. Laurent* and your Secretary. He last reported a visit to South Pasadena from the *Kepners* of Denver and said he and Marge were planning a trip in April to Europe or the South Seas. . . . Faithful correspondent and 50th Reunion Chairman *George Chutter* says: "Last month found me in bed with the flu, so you did not get any word from me. I am much better now—almost human! I went to Cambridge for the Alumni Council meeting and saw *Josh Crosby, Ed Dubé, Chick Kurth* and *Ace Road.*" Neither flu nor the cold weather around Box 305, East Dennis, Mass. 02641, has kept George from contacting *Ray St. Laurent* to learn of Ray's progress. Thanks, George!

A. Abba Orlinger, patent and trademark lawyer with offices at 2820 Graybar Bldg., 420 Lexington Ave., New York, N.Y. 10017, writes: "In 1968, I was awarded the degree of J.D. by Brooklyn Law School." . . . *Albert E. Bachmann,* Box 547, Keystone Heights, Fla. 32656, sends a welcome note: "Have been retired for a few years after 45 years in the paper business. Living away from crowds and traffic. Please send me Jack Healy's address." Here it is, Al: *John J. Healy, Jr.,* 1 Crescent Ave., Scituate, Mass. 02066.

Couple deceased

We regret to record the passing of both Gladys and George Piroumoff and we extend the sincerest sympathy of the Class to their family. Sumner Hayward has sent us an article from the New York *Times,* which reports that Mrs. Gladys Higgins Piroumoff, wife of *George Sergei Piroumoff,* 570 Park Ave., New York, N.Y. 10021, died on April 3, 1969, a day after the death of her husband. Born in 1896, she joined us in the senior year and was graduated in Course II. For the next year, he was an instructor at M.I.T. in the Department of Mechanical Engineering. From 1924 to 1926, he was an instructor on the staff of the Institute's Department of Chemical Engineering. He later joined the research department of the White Motor Co., Cleveland. In 1930, he was technical assistant to the president of the Brockway-Indiana Motor Co., and from 1935, until his retirement in 1953, he was president of the Brockway Motor Truck Corp. The couple are survived by three children, Miss Nina Piroumoff, New York, Mrs. Margaret Higgins Henry, Tempe, Ariz., and George Piroumoff, West Hartford, Conn., and three grandchildren. George is also survived by a sister and two brothers.

Reminders

Homecoming (Alumni Day) is right upon us—June 16—so take swift action and contact the M.I.T. Alumni Association for reservations for you and your wife. Join '21 for dinner at The Charter House, Cambridge, on Sunday evening, June 15, and spend Monday having a good time with your old friends. If you can't be present, write to your secretaries, especially if the Class hasn't heard from you for a long time.—*Carole A. Clarke,* Secretary, 608 Union Lane, Brielle, N.J. 08730; *Edwin T. Steffian,* Assistant Secretary, Steffian, Steffian & Bradley, Inc., 19 Temple Place, Boston, Mass. 02111; *Sumner Hayward,* Assistant Secretary, 224 Richards Road, Rigewood, N.J. 07450

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This is your Secretary's secretary speaking; he is now at 39,000 feet crossing the Iron Curtain into Prague's nervously inspired communist territory. Then he will tour the walled Old Town at Dubrovnik, motor to Kotar, Budva and Sv. Stefan. He wore a sailor hat for the cruise to Korcula to see the exciting Moreska sword dance to return via Trstenik. The itinerary calls for lunch at the Harmashatorhegy Restaurant in Budapest with wine tasting at the Citadel. He will bicycle around the nine lakes in Bucharest and visit Mongosoia Castle and the Snagov Monastary. Then on to medieval Sibiu to visit the Brukenthal Museum. He is looking forward to seeing the Black Church and Bran Castle in Brasov. After going back to Bucharest for a meeting with Government officials and business men, he will travel to Vienna, spend a few days in Copenhagen and finally conclude the Trade Mission with several meetings in Amsterdam. He will return in May to all of us at Ferguson Electric full of renewed pep and tall stories about his experiences in Eastern Europe. The Class will also be hearing about it in June and through later notes.

Oscar Horovitz who had just returned from Florida sent in a clipping regarding the death of *John F. Halpin,* a retired engineer of Salisbury Manor, South Nyack. John had lived there for three years. He was a native of Northampton, Mass., and had lived in Ossining for forty years while working as Assistant Designing Engineer for the New York Central Railroad. A Navy Commander of the 102nd Construction Battalion in the South Pacific from 1939 to 1946, he served until 1960 as commander of the Navy Reserve Unit in Yonkers, then retiring with the rank of Captain. We enjoyed John's company at the 45th Reunion. Our most sincere sympathy goes to his family.

We have no letters from Classmates or items from the Institute so in the vacant space, a secret can be told: During March your Secretary received the Gold Medal for 1969 of The Buffalo Club, a century-old organization. This followed an earlier citation given him as the Buffalo Chamber of Commerce "Man of the Year." He feels so honored with having received this and other recognitions that he hasn't broadcast the news as fully as have the Buffalo newspapers. (Don't tell him that the story is out!)

The report on Buffalo weather is still sunny and warm! We are still looking for the "little winter that wasn't there" and didn't come. However, Buffalo was lucky in that it was just chilly enough at Easter to keep out the vacationing college students. Ft. Lauderdale can have them! [The preceding comment is not to be construed as reflecting the opinion of the Institute—Ed.]

Raymond E. Miskelly, Yarmouth Port, Maine; *Platt C. Benedict,* Glendale, Calif; Colonel *Ross B. Warren,* Corpus Christi, Texas. And now—Farewell until the next Trade Mission gives the Secretary's secretary (McFarland) another chance.—*Whitworth Ferguson,* Secretary, 333 Ellicott St., Buffalo, N.Y. 14203; *Oscar Horovitz,* Assistant Secretary, 45 Gerard St., Boston, Mass. 02119

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This month's notes will be short but not sweet as the ensuing news will show. *Dave Skinner* made it to the Mexico City Fiesta but reported little. He writes "We had a good time in Mexico and were sorry you couldn't be there. I'm still writing Mexico Transworld Tours trying to get my deposit straightened out. I hope you've been able to get yours back." Not yet, Dave, we've been trying to get ours since January. Mañana is the rule there, we gather. . . . *E. Louis Greenblatt* sends a card from Spain (postmark obscured) saying "Greetings from southern Spain, Gibraltar and Tangiers where I have been vacationing. Regards."

Deceased

Now on the sad side we have reports of two deaths. The first came through *Forrest Lange* from a friend in Osterville, Mass. The latter writes: "*Parker* [*Holden*] passed away February 21, 1969 at Naples, Fla. He and his wife Alice were down there for a few months vacation. As far as any one knew he was in good health and had been very active here golfing, bowling, gardening, etc. He had been golfing that afternoon, came home, but was evidently unable to get out of his car. He was gone before they could get him to the hospital." We have since heard from Alice Holden that she and Parker had attended our 45th Reunion at Bass River where unfortunately we did not happen to meet. The obituary notice tells us that Parker was born in Dorchester, Mass in 1901. After graduation, he joined the Fiberloid Corp., of Indian Orchard, Mass. In 1929 he married Alice Hall of Great Barrington, Mass and in 1937 he joined the Stowe Woodward Co., of Newton Housatonic, Mass., as Head Chemist. In 1953 Parker was with the Tyer Rubber Co., of Andover until 1960 when he and Alice moved to the Cape where they "enjoyed eight years of happy retirement."

From *John L. Brill* we learn that *Joseph C. Nowell* died suddenly in Ft. Lauderdale, Fla., early this month. We have no further details, at least at the time of our *Technology Review* deadline.

Now we have some good news that we can relate concerning *Pete Pennypacker.*



Horacio Serrano, '24, and family. Sitting: Horacio and wife, standing: Sol, MeElcna, Margarita, Marcela and two prospective sons-in-law.



Rutilio Torres G Saravia, '24 (left).

Pete has just authorized us to tell all about his succumbing to a stroke which happened last October. He was completely out of circulation for some seven months, three months at the Middlesex Hospital in Middletown, Conn., followed by four months in a convalescent hospital in Chester, Conn. His daughter Judy Goodwin told me that her father is doing beautifully and has actually picked up some of his consulting work again. Doris was away when I called but Pete feels fully able to take on the voluminous class files and help me give them a good going over, etc. This is great news indeed, the kind we like to hear. Pete says that he is completely operational except for the need of a cane and walker. Incidentally, does anyone want to take on the job sometime soon and write a history of the Class of 1923? This will be a good thing for someone who has been active in going to the Reunions. Both Forrest Lange and Bondie have warned us to be careful about the files in the matter of weeding out. Please let me know, whoever you are, if you are interested.

New addresses

W. Harold Donnelly, P.O. Box 443, Southern Pines, N.C., 28387; *Erling Skabo,* 41 Derwent Ave., Linidisfarne, Tasmania, Australia; *William W. Vicinus,* Apt. 16, 450 S. Los Robles Ave., Pasadena, Calif., 91106.—*Thomas E. Rounds,* Secretary-Treasurer, 25 Ridge Rd., Danbury, Conn. 06810

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It is something of a coincidence that our two leading clerics have been the subjects of magazine articles in recent months. First it was the Reverend *Denton Massey.* Now the February issue of *The Episcopalian* has a "Know Your Diocese" story on the Missionary District of Taiwan. We've kept you informed of Jimmie Wong's career through the years, but there's a thumbnail sketch accompanying this piece that wraps it all up neatly.

"The Rt. Reverend *James C. L. Wong,* Bishop of Taiwan, was born and educated in China. He attended the Massachusetts Institute of Technology where he received a B.S. degree in naval architecture and marine engineering in 1924. He worked as an engineer in Massachusetts, Northern Ireland, England, Hong Kong, and Australia. He is a member of the Royal Institution of Naval Architects, a Fellow of the Institution of Mechanical Engineers, a member of the Institute of Marine Engineers and Institution of Engineers, a member of the Institute of Marine Engineers and Institution of Engineers, and past president of the Hong Kong Engineering Society.

"Bishop Wong was a lay reader in the dioceses of Massachusetts and Hong Kong and studied theology under tutorship. In 1938 he was ordained deacon and in 1940 was advanced to the priesthood. He continued as a naval architect while serving parishes in Hong Kong without salary. After he retired from secular work in 1960, he was consecrated Assistant Bishop of Borneo. He was appointed Bishop of Jesselton (now Sabah) in 1962, and became Bishop of Taiwan in 1965. (It doesn't say so here, but Jimmie resigned from that Jesselton post because it entailed many long and exhausting trips by dugout deep into the North Borneo jungles, and at his age it was a bit too strenuous. So he was called out of a second retirement to go to Taiwan.)

"He served as executive secretary of the Chinese Colleges Joint Council in 1937-39 in Hong Kong; during this time he organized a group of colleges into what is now the Chinese University. Bishop and Mrs. Wong were married in 1929 and have four children and six grandchildren."

Retirees—reluctant and otherwise

Maybe *Gordon Harvey* will get some retirement pointers in June that will make him a bit less skeptical of the prospect. He writes that he has taken "my first fluttering steps toward that supposed haven from pressures. We have contracted for construction of a home northwest of Fort Lauderdale in Florida. It will be completed by next winter, although Clare and I plan to occupy it only during my winter vacation periods for the next few years until I make the big step. Even then I expect to spend four to six months each year back in this area (Genesee State Park south of Rochester, N.Y.) as a park system consultant. I am experiencing the usual (?) 'withdrawal' pains in contemplating retirement after forty years in New York State parks. My work is fascinating and rewarding. You know how beautiful a setting we have in our home in the Park. It will be hard to break away. However, I have a few years for the transition." Of course Gordon's work schedule has not been like that of most of us—no twice-a-day battle with commuter traffic, for example—but it's dollars to doughnuts he'll take to retirement much more easily than he imagines.

Our other representative from the Far East, *Luang Videt-Yontrakich,* is still in the Washington area. After he retired Videt was a Thai consultant at the Military Assistance Institute, but last year a budget slash caused the Institute to fold. Daughter Parita is a freshman at Goucher, and son Pote, still at Exeter, is aiming for Harvard. Both Videt and Sompongse have been having their troubles physically of late, and this, combined with a projected trip home to visit sick parents, will keep them away from the reunion. "But I hope my life will be prolonged for enough to attend the 50th Year Reunion in 1974." Amen.

While the Cardinals were sitting out the worst of winter in Florida, they managed to get in touch with the Duevels after many tries. Seems that Cy had just returned from an underwater research expedition in the British Bahamas. There was no further expansion on this intriguing bit of news, except for Paul's comment, "I hope that when we get up to New Hampshire Cy will be able to give us a demonstration of deep diving and such things as measuring the compression in a shark's bite." We all know about taking preventive medicine for snake bite—but shark bite? Guess we'll just have to wait and let Cy demonstrate.

Terranaut Torres

Ru Torres completed his South Africa-South America tour just in time to take in the Mexican Fiesta. He joined *Johnny Fitch* and *Nish Cornish* there, the only other '24 representatives. Ru sent along several photos, including one showing him about to descend 8,000 feet into the "City Deep Mine" in Johannes-

burg. He is very happy and smiling in the picture, but it's just as well it was a "before" and not an "after" shot. He was down there for 3 hours with the temperature between 90 and 100 degrees! There were also several group pictures of Horacio Serrano and his charming family, including a couple of prospective sons-in-law. Chile looks as though he might still be in his old fencing trim. These will go along to the *Review* editor, but they may be too small for good reproduction. Ru wasn't at all sure about the reunion, "a few social and business matters on the way," but it is to be hoped he makes it.

"The Board of Directors of Modern Talking Picture Service, Inc., has honored retiring Executive Vice President *William H. Mac Callum* by presenting a $1,000 check to the DAVI Scholarship Fund. Scholarships will be given to qualified students for advanced study in audio-visual education." Then follows a lengthy list of Bill's memberships and achievements, ending with: "Modern Talking Picture Service is to be commended for expressing their gratitude and respect for Mr. Mac Cullum in a way that will make it easier to follow in his footsteps." Those are big footsteps.

The thinning ranks

Our numbers have been still further depleted in recent months. *Harold G. Donovan* died in Connecticut last March. As many of you will remember, Hal was one of our first Secretaries. Then he completely lost touch. In spite of the fact that he was in the Boston area, from 1942 to 1961 he never participated in any class or alumni activities. When he retired from business two years ago he was secretary of Hanover Insurance in New York.

You will probably remember *Thomas E. Fitzgerald* as one of our stellar baseball performers. He never lost that interest. He combined teaching with baseball and football coaching, first at Stoughton High, then at Brookline High, both in Massachusetts. Recently he was elected to the Massachusetts Baseball Coaches Hall of Fame. Tom retired in 1965 and in March, after a brief illness, he died.

In February, *Donald B. Mason* died in Weston, Conn. He was with us for only a year, getting his master's degree in chemical engineering. Don was a veteran of W.W. I, and did his undergraduate work at the university of Rochester.

Belatedly we also have word of the death of another chemical engineer, *Donald W. McCready*. After M.I.T. he went on to the University of Michigan where he earned his Ph.D., then stayed there on the faculty of the Department of Chemical and Metallurgical Engineering. He died in October 1967.

Before you read the next column our 45-year reunion will have come and gone, but it will probably be too late for inclusion in the mid-summer issue. If so, there will be a wealth of material to start off with next fall. For instance: Will *Al Roig* prove his piscatorial prowess on the waters of Lake Winnipesaukee? (And did you know that name has been spelled 132 different ways?) Will *Cy Duevel* demonstrate his newly discovered deep diving abilities in its chilly depths? How many golfers will limit themselves to the Cardiac Course? Who will win the Veranda Rocking Chair Championship? All these and many more events will be reported in whatever detail seem warranted.—*Henry B. Kane,* Secretary, Box 177, Lincoln Center, Mass. 01773

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Material for this month's column is very skimpy. *Garvin* "Chink" *Drew* tried to look me up at the Institue a short time ago, but he happened by on one of the days I was down on Cape Cod—a drawback of spending part-time at the Institute. Chink did send me a letter he had received from *Roger Ward* several weeks ago, and Roger noted in his letter that he will guarantee to be with us for our 45th reunion which, incidentally, is only a little over a year away. As a reminder to all of you, the location for the reunion is the Bald Peak Colony Club in Melvin Village, N.H. Although the exact date has not been set, it will probably begin on Friday evening June 12, 1970 and carry through Alumni Day, June 15th, 1970. *Fred Greer* and *Ed Kussmaul* are Chairman and Deputy Chairman for the event, and Sam Spiker and your secretary will be getting together with them for planning purposes in the near future. Why don't you mark the dates on your calendar now!

An interesting letter from *Myron Doucette* who is busily employed at the Stony Brook Long Island Campus of the State University of New York indicates that they are having some of the problems on that campus which seem to be so common these days throughout the country. Myron also notes that he has heard recently from *Henry Sachs* whose activities have been reported in this column, and from *George Oetinger* who is now retired and living in Florida. All three of them have memories of having served in the ROTC and later with the Ordnance Corps during World War II. He also included with his letter a few pages copied from a Haverhill, Mass., high school paper titled *The Pennant,* dated March 1909. It contained an article on Tech. It is an interesting article and would be fine for comparing the Tech on Boylston Street of 1909 with the M.I.T. as we knew it in the early 20's, and the M.I.T. of today which can only be appreciated by seeing it in action. This is just a further plug for your attending the Reunion and the Alumni Day which follows!—*F. L. Foster,* Secretary, Room 4-144, M.I.T., Cambridge, Mass. 02139

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This Sunday evening finds your secretary relieved to find on the top of the folder letters from two classmates that are of sufficient interest and length to make the June notes. I say relieved because there is nothing to ad lib about. The snow has gone and we are starting to acquire new fittings for the boat but it is off season and there isn't too much local news. Uppermost in the minds of most of us is retirement. It is either here or about to be. Regardless of the outward expressions of how wonderful it is, the cold facts are that it represents drastic change in most of our lives, so we are happy to express any and all opinions and ideas that touch on the subject.

One classmate relates a plan that is comfortable and sounds ideal. I'll not elaborate—let's hear what *Don Chase* writes from Orange, Conn. "Dear George, The chief item of interest in the *Technology Review* is always reading about other class members. I recently attended an Alumni Meeting of the New Haven group and had a very pleasant evening with *Eben Haskell, Al Libbey* and their wives. Both seem very well and Al is with the New Haven Housing Board trying to settle some of their many problems.

Eben is still enjoying his work with the United Illuminating Co., and expects to retire next year. I am still with Farrel Co., but we were just taken over by U.S.M.C. I reach retirement age this year and have been asked to stay on as consultant for a while. Harriett and I are going to Europe in May, mostly business but some vacation on the Bergen Line ship, *Meteor,* along the Norwegian coast. In another year I expect to start building a home on the Cape in Yarmouthport. I understand that *Ray Bete* has already retired and is living on Cape Cod near Sandwich. *Al Billings* has retired from Kelly Springfield and still lives in Cumberland, Md. *Roy Copley* is still in good health in St. Petersburg after overcoming some serious illness. We still remember our nice visit to Pigeon Cove at reunion time and I'm looking forward to the 45th. Hoping that you are continuing to enjoy your ocean view. Sincerely, *Don Chase.*" Don also mentioned that the *Meteor* sails out of San Juan to various islands in the Carribean and he recommends this trip highly. It really sounds interesting.

Tip on retirement

Now for a surprise—a letter from *Jim Bamford* with whom we used to communicate when he was mayor of Reading, Pa., nearly 20 years ago. Jim has some thought provoking ideas for retiring members of the Class of '26. To explain his first sentence, the last photograph I saw of Jim showed him slightly more bald than a billiard ball. We quote, "Dear George, The last time we were in touch there was a furor about a hair-growing remedy that had been presented to me in City Hall in 1954. You can remove that from your active file. It didn't work. I have a suggestion for those who have achieved middle age and wonder what to do after travelling has palled. Currently, as detailed in the enclosed

announcements, we're eyeing local government, education and politics. These are three fields desperately in need of research, dispassionate analysis and innovations. Certainly the Class of 1926 is richly endowed with ability in the first two of these and many of its members have also been creative. Government and politics are not difficult fields to enter, even diffidently and with due caution. For inspiration one needs only to drive about in a suburban area. One visit to one political rally for local candidates will suffice for politics. One but needs to remind oneself: 'My God, this is where most U.S. Presidents originate.' It is more difficult for a layman to participate in education but it is a more genteel field; unless you happen to favor change. I am not proposing that retired '26ers run for office or otherwise engage in heroics. Local government and education, with few exceptions, are controlled by two kinds of politicians: 1-The intellectually least-chanced who find politics a quick road to pseudo superiority; 2-Slightly capable people with a burning personal ambition. Today these front runners, frustrated by the complexities of governmental management, can be sold counsel and advise by any 'group' who demonstrate ability coupled with the absence of any threat to the incumbent leadership. There are vast areas in the background in which something worthwhile can be accomplished. Please note that I said 'any group.' There's no fun in and little accomplishment results from trying it alone. Three or four can be rewardingly effective. As they go along they may discover an interesting fact. It takes only 0.2 per cent of the population working on an average of 5.0 per cent of their time (based on a 40 hour week) and using the skills perfected by American business, to become a powerful force in local politics in any political sub-division in the country. My conscience has writhed about periodically, screaming at me: 'Give *George Smith* a hand. Write to him!' Actually, however, my varied activities have seemed to have little place in the austere annals of Tech graduates. Maybe, now that everyone is retiring from science and engineering, I'll feel more at liberty to elbow my way into the class notes. Anyway, thank you."

I don't know where Jim gets his statistics but if he is anywhere near right a few of us could make our presence felt by applying ourselves. If any of you care to investigate, why not contact Jim Bamford, 12 South 5th St., Reading, Pa. It is thought provoking to say the least. Before signing off I must mention that I'm writing on Easter Sunday and Ruth's Easter lily on a table six feet away has been emitting heavenly perfume all the while. It always reminds me of Bermuda where Easter lillies grow in the fields and their wonderful perfume is ever present. With the ocean surf making the same sound outside and this pleasant aroma filling the room, the fantasy of being at our favorite island while writing class notes is complete. So rather than disperse the fantasy we say, Cheerio until July.—*George Warren Smith,* Box 327, Pigeon Cove, Mass. 01966

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Unfortunately, we have not learned until now of the death of *Arturo Marqués* on October 13, 1966. A native of Uraguay, he attended the University of Montevideo before coming to M.I.T. At Tech, he will be remembered as a star of our soccer teams for four consecutive years. He graduated in Course II. Returning to Uruguay after graduation, Arturo became prominent in M.I.T. affairs and in 1945, when he was secretary-treasurer of the M.I.T. club in Montevideo; he came to the States on business and was the guest of a meeting of the Alumni Council at Walker Memorial. He later became president of the Montevideo club, and was always generous in his offers of hospitality to visiting classmates and others from M.I.T. In 1963, he was a member of the educational council in the Uruguay area.

As you will all have seen, *Bud Fisher*'s name appears on the ballot of the Alumni Association as vice-presidential nominee. This well-deserved honor comes after substantial work with M.I.T. problems, including our own class gift and with the Alumni Center of New York. . . . We are grateful to *Art Connell* for sending us news that *Bill Taggart,* president of Dewey & Almy Chemical division of W. R. Grace & Co., has been appointed vice-president of the industrial chemical group of Grace.

Joe Burley, president of Boston Insulated Wire & Cable Co., is planning to retire at the end of this year. . . . Du Pont has announced the retirement of *Jim Castner* after 41 years with the company. For the past five years, he has been assistant manager of the accounting and business analysis division of the Plastics Departments. During World War II, Jim was was manager of the Military Explosives Division, and in 1945 was a civilian technician for the U.S. Navy Technical Mission in Europe. In 1958, he became director of laboratories of the Research & Development Division. Hope that Jim will write us of his retirement plans.

Wayne Wagar has retired from his own public accounting firm and has been appointed assistant professor of accounting at Central Michigan University School of Business, Mount Pleasant, Michigan.

George M. Cunningham says, "retirement is fun." He and Mrs. Cunningham have travelled extensively; George attends classes in ceramics regularly, sings in two musical groups, is president of the Laguna Beach, Calif., Concert Association, still has time for his boat and some fishing. . . . *Phil Darling* says, "I do enough consulting to enjoy it and make so little money that Uncle Sam isn't getting richer either." His wife, Dora, had been ill but is recovering now, which we are glad to hear. . . . *Howard Ferguson* started his retirement with a trip to Israel and the Holy Land, Turkey and Greece. Later he went south to improve his golf game. Whether the improvement occurred, we do not know, but you recall Howard won the golf prize at our 45th reunion.

New addresses & twenty-five year ago happenings

John Keary has moved from Boston to Pleasant St., Bass River, Mass. Sounds like a good retirement address. . . . *Otmar Praznik* has moved from Baltimore to 140 Greene St., Wollaston, Mass. 02170.

In June 1944, the notes recorded that Captain Sidney Waugh was an art expert with the 5th army allied military government in Italy; *Howard Ferguson* wrote in the news of *Art Connell*'s impending marriage; *Amos Akerman* was promoted to the rank of colonel and living in Orlando, Fla.; *Bernard Manseau* had become a navy captain and had returned from the Pacific. He was then living in Washington; *Ralph Johnson* was in Hawaii wearing three full stripes; *Alf Berle* had concluded a highly successful year as agent for the Alumni Fund with 74 per cent of us contributing. . . . With these notes and my income tax going out in the same mail, I feel better.—*Joseph S. Harris,* Secretary, Box 654, Masons Island, Mystic, Conn. 06335

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Apparently spring fever is rampant throughout the country as well as in Lexington. We don't seem to have much news of earth-shaking importance to report in these notes.

An envelope from *Al Gracia* includes a note that says an enclosed clipping from the Akron *Beacon Journal* describes his retirement on March 31 as Goodyear research vice president. Al has been closely associated with the development of synthetic rubber and atomic energy during his 40 years with Goodyear. He started as a research trainee in 1928 and during his stay in Akron was actively engaged on social and educational levels as well as professional. After holding several managerial positions including assistant manager of research and development, he became general manager of Good year Atomic Corp. In 1956 he was awarded the Litchfield Merit Award for his administrative ability in establishing the gaseous diffusion plant ahead of schedule. Today, Goodyear Atomic and the Oak Ridge, Tenn., plant are the only producers of high assay Uranium 235, and Goodyear is the largest processor of this substance for peacetime use.

In addition to various professional groups he is a trustee of Defiance College; a member of the visiting committee of M.I.T. and the Harvard Business School Fund Council. His national involvement includes membership on the board of directors of United Community Funds and Councils of America and panel

chairman of its national budget and consultation committee. He is past chairman of the National Citizens' Study of the American Social Health Association.

In Ohio he is on the State Citizens' Council for Health and Welfare and is past chairman of the Ohio Committee for Christian Higher Education Fund. A member of Numerous United Community Council Committees in Akron, he served as chairman of the Mayor's Task Force on Human Relations and the Citizens' Committee for Comprehensive Mental Health and Mental Retardation Plan Implementation. Al was honored with the Distinguished Award of Council by the Akron Council of Engineering and Scientific Societies and the Human Relations Award by the Akron Urban League. With this enormous interest in the social welfare of his community and the country it is needless to ask Al how he intends to keep busy after his retirement.

In a note from our Alumni office we learn that *Claude Rice* can now be reached through our mail service at Box 4027, Valley Village Station, North Hollywood, Calif. 91607; and another Alumni note records that *Edward Petzold* has a new address: Apartment 301, 2721 South Bayshore Drive, Miami, Florida 33133.

We might take a paragraph or two from a letter *Bill Archibald* (long with Jones & Laughlin Steel Corp., in Pittsburgh) recently sent to *Jim Donovan:* "Perhaps I will make the Alumni-Student weekend in mid-April or thereabouts; but, as you may have read in the newspapers, we have a few problems these days. Unfortunately these are not the type of problems they take up in problem solving courses nor do any of us have any prior experience in these matters, so we, too, only know what we read in the papers. Considering our ages, Clara and I seem to be in reasonably good health and we can only wish the same for you and Frances. Our best regards."—*Hermon S. Swartz,* Construction Publishing Co., Inc., 27 Muzzey St., Lexington, Mass. 02173

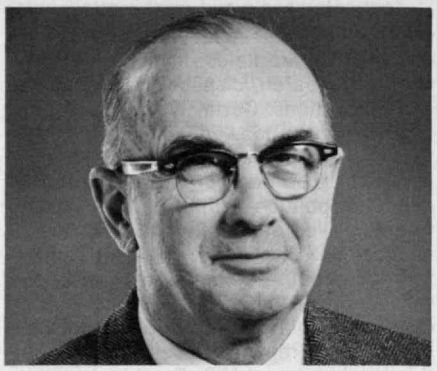
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The long-awaited moment of the 40th class reunion is just about here. *Everett Kelley,* of Lynn, sent a note saying though he probably won't be attending his thoughts will be with us nevertheless. Everett was good enough to send in a newspaper picture from the Herald which showed M.I.T. students participating in what was known as "The Game" back in 1925. The student who climed the grease covered structure and got hold of a paddle was rewarded with a free copy of the yearbook (the game was sponsored by Technique). Everett was proud to recollect that he "covered himself with glory and grease" to win the wooden plaque, which his wife uncovered in the attic to bring back memories. Thanks for sending this along, Everett, hope you can make the reunion as certainly there will be many such things to reminisce about at Wianno when all the gang is there.

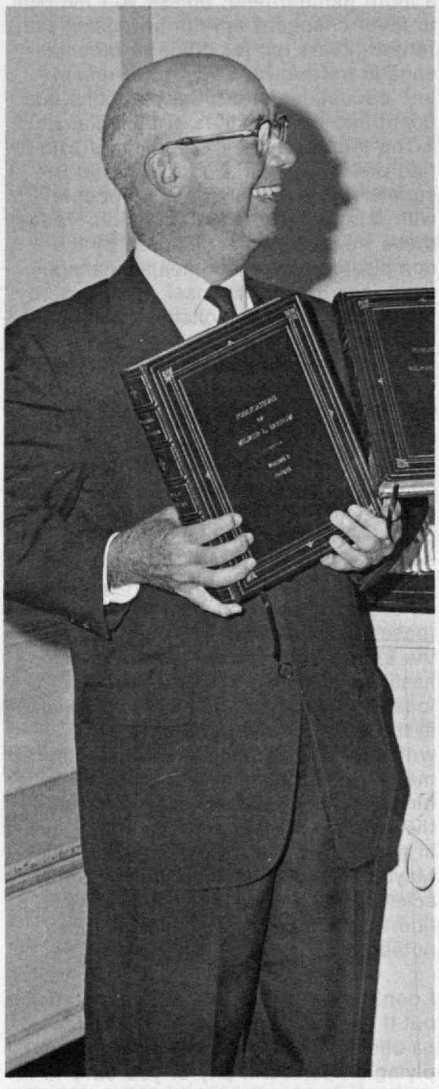
We have previously reported *Gordon Carr*'s successful career as a professional architect in New York and now find that he is an accomplished watercolorist as well. In March, the Grand Central Art Galleries of New York exhibited a group of his paintings ("Native Lagoon," "Knockdown" "Patience," "Fortitude," and "Ground Fog") representing his third one-man exhibition at the gallery. The subjects of his paintings are people, boats and the sea. His interest in this art was influenced by two painter friends, Gordon Grant and Roy Mason, followed by later studies with Syd Browne and Herb Olsen. Gordon has participated in the Navy Art Program (NACAL) a cooperative effort of the Salmagundi Club and the U.S. Navy and had been on two assignments as a Navy "Combat Artist" in the Anti-Submarine Warefare games in the North Atlantic. Gordon's watercolors have also been exhibited in Academic Artists, Springfield (Mass.) Museum of Fine Arts, Allied Artists of America, America Watercolor Society, Hartford Atheneum, Greenwich Art Society, Hudson Valley Art Association, Knickerbocker Artists, National Academy, National Arts Club, Ogunquit, Maine, Salmagundi, St. Croix Art Society, and others. His paintings are in the Burndy Collection of Industry, the U.S. Navy, and many private collections.

Joseph D. Murphy is also an architect and he made the news as President of the F.A.I.A. He is associated with the firm of Murphy and Mackey in St. Louis which he founded in 1950 with Eugene Mackey. Joe was awarded the Paris Prize in Architecture in 1929, and studied at the Ecole des Beaux Arts from 1929 to 1931. From 1935 to 1952, he was Professor of Architecture at Washington University, and was Dean of the School of Architecture from 1949 to 1952. He has received many design awards for excellence, which include the Loretto Hilton Center for the Performing Arts at Webster College and the John Olin Library at Washington University. He has been active as President of the St. Louis Chapter, American Institute of Architects, chairman of the Jury of Fellows, A.I.A., and as chairman of the University City and the St. Louis County Planning Commissions. An architectural consultant to the U.S. Army Engineers, and a member of the advisory panel on architectural services, General Services Administration of the United States Government, Joe resides in University City, Mo., with his wife and nine children.

In December *Wilmer L. Barrow* retired from his position as vice president of research and development of Sperry Division of Sperry Rand Corporation, Great Neck, New York, after 25 years with the Company. Most of his career was devoted to pioneering work in microwave research for which he has received many honors, including a Presidential Citation following his World War II membership in the



Joseph D. Murphy, '29



Wilmer Barrow, '29, at a reception honoring him on retirement receiving two handsomely bound volumes, one containing copies of his 26 patents, the other an equal number of technical papers authored by him. Hosting the reception were staff members of the Sperry Rand Research Center which was established in 1960 under Dr. Barrow's direction. His theory, research and application of UHF propagation in wavelengths waveguides and radiation from horns, known as "Barrow horns," won him widespread recognition in government, industry and technical societies.

National Defense Research Council "in recognition of . . . outstanding services . . . in the field of microwave radar development, which proved to be an invaluable contribution to the war efforts of the United States and its Allies." He has been recognized for his work in theory, research, and application of UHF propagation in waveguides and radiation from horns, which have been named "Barrow horns." He received the Sc.D. degree in 1931 from the Technische Hockschule of Munich and won the I.R.E. Morris Liebmann Memorial Prize in 1943 as well as I.E.E.E. Edison Medal in 1966.

A note from *Hyman Fine* brings up up to date on his activities in Norfolk where he is now president, Virginia Section, American Society of Civil Engineers. Will expect to glean many more news items at the reunion and Class Day so hope to see many of you there. Regards. —*John P. Rich,* Secretary, P.O. Box 503, Nashua, N.H. 03060

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Occasionally your secretary receives inconsistent reports from different sources of what is presumably the same event. Those of you who have read Herodotus will recall that he solved this problem in an eminently practical and frequently delightful fashion by reporting several versions of the event and permitting the reader to take his choice. Following this practice, we have a report from a Natick newspaper that *John Molloy* has been apponited general manager of New England Gas and Electric System and a report from *The Magazine of Cambridge* that he has been made general manager of Cambridge Electric Light Co. Congratulations either way, John.

Howard Richardson is chairman and professor of physics at Adelphi University in Garden City, N.Y. His extra-curricular activities include translation editor of the *Soviet Journal of Optical Technology* for the Optical Society of America and president of the Wilderness Community of Mt. Holly, Vt. The Richardsons have three children: Peter, Dartmouth '61, who is teaching at the University of Minnesota; Holbrooke, Princeton '65, who is doing graduate work at Harvard; and Marina, Connecticut College for Women '60, who is married and has two children.

Hermon Scott's manifold business and civic activities have been previously reported in several issues of the *Review*. To bring you up to date, since the last report Scotty has become trustee of the Boston Ballet, the Deaconess Hospital and the Diabetes Foundation. The Scott daughters Priscilla and Jane have graduated from Elmira and Mt. Ida Colleges, respectively, and Priscilla is working for Time-Life. Scotty and Ellie went around the world last fall with stops at Japan, Formosa, Hong Kong, Thailand and Europe.

As reported in April, 1964, *Jim Saunders* is Principal of the Northbridge Junior-Senior High School. He says he is looking forward to retirement in another year and has apparently been getting in a little preliminary practice for this event by becoming a mobile home owner—Airstream #18214. He lists among his hobbies amateur radio (WIBDV) and "Music—HiFi—play drums."

Bob Schildknecht has retired as a commander U.S.N.R. after 24 years of active and reserve duty and is practicing architecture in Cincinnati. The Schildknechts have three sons: Robert, who graduated from Miami University and is now in the Navy assigned to the U.S.S. Saratoga; William, who is a sophomore at University of Cincinnati; and John, who is in high school. Bob is a member of A.I.A., the Exchange Club, the Military Order of the World Wars and the M.I.T. Club of Cincinnati. He says he expects to attend the 40th reunion.

Asa (Zeke) *Shannon* has moved from the Missouri River Division of the U.S. Army Corps of Engineers to the Southwestern Division where he is Chief of the Engineering Division with headquarters in Dallas. As previously reported, the Shannon's daughter Lorene received a B.S. in architecture from Carnegie Tech. She is now practicing architecture in Pittsburgh. Zeke attended the World Power Conference in Moscow last August.

Deceased

We have at hand a notice from the Alumni Office that *Kenneth Tator* died on January 11, 1969. Upon reviewing my records I find that as of February 1967, Ken had his own consulting firm, Kenneth Tator Associates, in Caraopolis, Pa. His firm specialized in corrosion engineering and weather dynamics studies and had developed several ingenious accelerated weathering devices for testing roofing performance characteristics. Ken held a number of patents on corrosion barriers, plastic products and container linings. If any of you have further details, I should appreciate your forwarding them to me.

There is only one change of address: *Charles Habley,* Apartment 355, 1670 El Lamino, Menlo Park, Calif. 94025.—*Gordon K. Lister,* Secretary, 530 Fifth Ave., New York, N.Y. 10036

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Bob Martin writes that on September 1, 1968, he retired from regular business. Bob and Mrs. Martin moved permanently to Cotuit, Cape Cod and he has continued with some consulting assignments. In addition, when opportunities and time permit, he works with the Executive Service Corp. Meanwhile, he is taking a trip around the world.

Congratulations to *John Dodge* on his citation for distinguished service from the American Association of Physics Teachers. John has devoted most of his working life after leaving Tech to a distinguished career in teaching physics. Congratulations, also, to *Dick Kropf* upon his election as Chairman of The Thread Institute. As you will remember, Dick was the first recipient in 1964 of the Bronze Medal Award, the highest honor bestowed by the American Association for Textile Technology, Incidentally, Dick is president of Belding Heminway Co.

Talked with *Fred Elser* the other day. Fred and Mardy are still in Florida but apparently prefer their original home state of California and expect to return there by way of the northeastern U.S.A. and Canada. (Incidentally, for the information of any other '31 radio hams, we have a schedule every Saturaday at 5 p.m. EST on 14100 Kc and would enjoy having others join us.) Fred's call is now W70X/4 and mine is W1ES. . . . *Bob Fleming's* new address is c/o J. C. Pace, 352 Glenwood Ave., Daly City, Calif., 94015. Hope you all have a pleasant summer and please don't forget to stop in if you should be near Westport.—*Edwin S. Worden,* Secretary, 35 Minute Man Hill, Westport, Conn. 06880

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Received this note in February from *Robert D. Butler.* "Back some five years ago I finally joined the Married People's Club and married a very fine Brazilian girl named Dinair. I am still with Gulf Oil, transferred in 1964 from Rio de Janeiro to Lima and in late 1968 from Lima to Buenos Aires where I am Gulf's manager—East Coast, South America with specific responsibilities in Marketing and Crude Oil Sales. This is a very fine Gulf assignment and certainly most interesting."

Erskine G. Roberts who has been with the Argonne National Laboratory for the past nine years has been appointed by P & W Engineers Inc., a Chicago consulting firm, as Principal Engineer on its pollution control staff. He will have responsibility for presenting and directing the firm's pollution control services to Federal, State and local agencies. The diversity of his over 20 years experience will have significance to agencies and municipalities concerned with air pollution and solid waste disposal. Erskine and his family live at 8608 Dorchester Ave., Chicago, Ill.

Course catches on

Rolf Eliassen writes from Stanford University where he is Professor of Environmental Engineering, that the course titled, "Man and his Environment" which he started giving once a year to 30 students eight years ago, he now gives twice a year and the present enrollment in the winter quarter is 233. There is such an intense interest in the environmental field out there that he says it is a real pleasure to be able to influence so many students. It seems that this pollution control business is booming all over. Rolf's new address is 1910 Newell Road, Palo Alto, Calif. 94303. Maybe this will get him and Erskine together.

Deceased
A note tells us of the unexpected death of *Philip R. Mayo* on March 9, 1969. Philip was Manager of Product Planning and Market Development with American Optical Co., in Buffalo. His widow Carol S. Mayo resides at 4935 Alexander Drive, Clarence, N.Y. Philip's son Stephen S. Mayo is with the N.E. Telephone and Telegraph Co., in the Portland, Maine business office.

Since these notes are written before you have received the May issue, I can report nothing on responses to the poll on the contemplated interim reunion in Spain detailed in the May column. If you haven't written to *Ed Nealand,* Room E18-360, M.I.T., by the time you receive this issue, this is to remind you to write or call him if you can join the party. —*Elwood W. Schafer,* Secretary, Room 13-2145, M.I.T. Cambridge 02139; *James Harper,* Assistant Secretary, 2700 South Grant St., Arlington, Va.

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Well, Sir, after bucking a 120 m.p.h. headwind all the way, we finally made it over Mexico City, on the afternoon of March 12, 1969, at about 6:00 p.m., Central time. We had dropped down from 36,000 feet, to less than 20,000 which brought us just about on a level with the two bit Volcanos, Popocatepetl, 17,500 feet, and Citlaltepetl, 18,700 feet. At that time of day, the sun was striking only the tops of these two great mountains, and a more marvelous sight is hard to imagine.

Citla was not active in any way, but Popo was smoking just a little, as I expect it always is. Coming into Mexico City from the north, one sees but a glimpse of these mountains, but, entering from Miami, one passes right smack by them. Though the sun was not down, the Mexican Rockies, to the west, prevented much light from hitting these two peaks, except just enough to call attention to the snow atop them.

Then, we land, we taxi to the apron, we disembark, pass customs, and rush out for the thrill of a lifetime—to see who has come to meet us with the big banner "Tech is Hell." It was Bill and Ruthie Dennen, '17 (see photo '17 news). So, here are natives and residents of the U.S.A. meeting us instead of some of our Mexican brethren. The Fiesta will, in all fairness, be described in detail, elsewhere, or so we hope. [See May issue p. 96 and this issue Class of '21.—Ed.] However, we must mention its climactic event, the *Noche Mexicana,* at the home of Senor y Senora Frederico Tamm. This was a marvelous evening of Mexican drinks, food, and dancing; the food superb, the drinks surely outstanding, and the dancing really something to see as performed by M.I.T. men, with their wives and/or sweethearts. I saw no one who came close to being as clumsy as I might have been, doing the same thing. These Mexican dances are a joy to behold.

The next day, inasmuch as I was forced by an inept airline system to stay over, I was invited out to Clarence and Luisa Cornish's home for a very happy visit, with a few libations and a fine Mexican dinner in the garden. I just can't say enough for these fine people and their superb hospitality, and I mean all the Mexican Alumni, and not just Nish Cornish y Luisa. To close this phase, I just can't imagine bright people like *Dick Morse, Ellis Littmann, Jim Turner,* and so many others, passing up this fine Fiesta year after year. Why, we even got so far as to have one classmate sign up, and then not show up; our own *Courtney Marshall* of Texas. I hope Court tells me what happened. His name was on the registration list, so he paid his fee, I expect.

Jesuit "weatherman"
We start off the personal section this time with a rather different sort of personal story; that of our one and only Catholic priest, Father *Bernard F. Doucette,* S.J. For some years now, I have seen Father Doucette's name so that, finally, my curiosity got the better of me and I wrote him a short letter of inquiry, at his Manila Observatory address, using as an entering wedge the manufacture of telescopes by our old company, Warner and Swasey. The good Father's reply to me turned out to be almost two full typed pages, so I must needs paraphrase and foreshorten just a little. Father Doucette became a Jesuit in 1917, just out of Boston College, was ordained to the priesthood in 1930, and completed his studies in 1932. Part of this time he taught while studying meteorology as a special student at the Manila Observatory, between, as he says, Philosophy and Theology. This used up about three years, to 1927. After the special student phase, 1932, he attended M.I.T. for a year again studying Meteorology, under Professors Rossby and Willett. Returning to Manila in 1933, he was appointed Head of the Meteorological Division of the Manila Observatory. This arrangement was worked out by the Philippine government, whose Weather Station Central Office was the observatory. Five priests ran the station and from 1933 to 1941, Father Doucette was the "weatherman" in the Philippines. Extensive war damage was not repaired until 1951, when the government re-established the Weather station without the Jesuits. However, the U.S. Bureau of Standards and the Jesuits have taken up the observation and study of the ionosphere through the Radio Propagation Division of the N.B.S., Central Office, Boulder, Colo. Working closely with the High Altitude Observatory in Colorado and in cooperation with the Air Force, they also are making observations with the spectrohelioscope, studying the action on the sun. This is a supplement to the work done in the states as their observatory is close to 180 degrees from the U.S. operation. The sun is under observation continuously.

At Manila they also have a Seismic Division of which Father Doucette is a part. It appears that, inasmuch as the Manila observatory is no longer a weather station, their work is practically 100 per cent scientific study. So, he goes on to tell us a little about the Manila Observatory, 103 years old, last year. Folks, this has turned out to be a most interesting story, and I have tried to be as complete as possible. Father, as you say, you personally, know no classmates so that this story is a detached set of greetings. So what? You are an Alumnus, and a member of our Class, just as hundreds of others are. I appreciate hearing from you, and will see that the Observatory story gets into the proper hands in Cambridge. Many, many thanks from us all.

We have a short note from *Mal Mayer* announcing another trip; this time to Puerto Rico, then England, in and out of the Iron Curtain, thence to London to try another call on classmate *Bob Dodd,* a native (now) of that fascinating town. Mal is always trying to call on classmates all over the world, with limited success. But, he tries. Thanks, Mal. I have no names to send you. Maybe I buy you a latest Alumni Register, what? Best to all the family from us all.

The February issue of *Astronautics and Aeronautics* gives us a real story, "How Should Civil Aviation Develop to Serve Our Society Best." This was the topic of a Forum sponsored by the A.I.A.A. President and our own *John Wiley,* Director of Aviation for the Port Of New York, was one eighth of the eight man panel which discussed it at length. We cannot, here, begin to give even a short resume of the proceedings, to say nothing of a paraphrase job. However, we can quote our man a bit, "Making noise regulations easier is putting our heads in the sand," and, "one may see 1,200 separate political entities from the top of the Empire State Building, and hence I have 1,200 separate jobs on my head" from these entities, from needs, wants, gripes, jet noise, and mostest of all, don't wants. In general, it seems that there will probably be only one airport in the world ready for the 747, and only one parking lot, one set of highways, and, these will not be at the same airport: My, MY! For those who do not belong to the A.I.A.A., and who are interested in this particular panel writeup, I will keep the whole article, and send it to any properly interested party who asks, nicely, with a short biography attached to the request. This last is a must, and probably will discourage requests. Congratulations, *Johnny Wiley.* We are proud of y'all.

Many of us do not know what *Don Fink* is doing for a living, so here we go. A press release marks Don as a prime suspect. He is General Manager of the I.E.E.E., the world's largest technical society of about 160,000 members. Don is also the Editor-in-Chief of *Standard Handbook for Electrical Engineers,* Tenth Edition. He contributed to many of the previous editions, and is the author of many technical books. So, upon publication of the Tenth Edition, at a brief ceremony at I.E.E.E. headquarters, Don was presented

SPECIAL REDUCED RATES FOR M.I.T. ALUMNI

FIFTH ANNUAL TOUR PROGRAM—1969

This unique program of tours is offered to alumni of Harvard, Yale, Princeton and M.I.T. and their families. The tours are based on special reduced air fares which offer savings of hundreds of dollars on air travel. The tour to India, for example, is based on a special fare, available only to groups and only in conjunction with a tour, which is almost $400 less than the regular air fare. Special rates have also been obtained from hotels and sightseeing companies. Air travel is on regularly scheduled jet flights of major airlines.

The tour program covers four areas where those who might otherwise prefer to travel independently will find it advantageous to travel with a group. The itineraries have been carefully constructed to combine the freedom of individual travel with the convenience and saving of group travel. There is an avoidance of regimentation and an emphasis on leisure time, while a comprehensive program of sightseeing ensures a visit to all major points of interest. Hotel reservations are made as much as a year and a half in advance to ensure the finest in accommodations.

THE ORIENT

30 DAYS $1569

Mar. 22, Jun. 28, Jul. 26, Sept. 20

1969 will make the fifth consecutive year of operation for this fine tour, which offers the true highlights of the Orient at a sensible and realistic pace. Eleven days will be spent in **JAPAN,** divided between **TOKYO,** the ancient "classical" city of **KYOTO,** and the **FUJI-HAKONE NATIONAL PARK,** with excursions to **NARA** and **NIKKO.** Five days will be spent in **HONG KONG** and four in the fascinating city of **BANGKOK.** Shorter visits to **SINGAPORE** and the lovely island of **FORMOSA** complete the itinerary. Optional pre and post tour stops may be made in **HONOLULU** and the **WEST COAST** at no additional air fare.

A complete program of sightseeing will include all major points of scenic, cultural and historic interest. Features range from a tour of the canals and floating markets of Bangkok, an authentic Javanese "Rijsttafel" in Singapore, and a launch tour of Hong Kong harbor at sunset, to a "Mongolian Barbecue" in Taipei, and a trip on the ultra-modern 125 m.p.h. express trains of Japan.

Tour dates have been chosen to coincide with outstanding seasonal attractions in Japan, such as the spring cherry blossoms, and beautiful autumn leaves, and some of the greatest annual festivals in the Far East. Total cost is **$1569** from **California, $1739** from **Chicago, $1807** from **New York.** Special rates from other cities.

INDIA

Including NEPAL and PERSIA

29 DAYS $1636

Mar. 15, Mar. 22, Aug. 2, Oct. 4

An unusual opportunity to see the diverse and fascinating subcontinent of



India, together with the once-forbidden kingdom of Nepal and the rarely-seen splendors of ancient Persia. Here is India from the mighty Himalayas to the palm-fringed Bay of Bengal: the great seaport of **BOMBAY;** the magnificent cave temples of **AJANTA** and **ELLORA,** whose thousand year old frescoes are among the outstanding achievements of Indian art; **MADRAS,** in the south; the great industrial city of **CALCUTTA;** a thrilling flight into the Himalayas to **KATHMANDU,** capital of **NEPAL,** where ancient palaces and temples abound in a land still relatively untouched by modern civilization; the holy city of **BENARES** on the sacred River Ganges; **AGRA,** with not only the Taj Mahal, but many other celebrated monuments of the Moghul period such as the Agra Fort and the fabulous deserted city of Fatehpur Sikri; the walled "pink city" of **JAIPUR** with an elephant ride at nearby Amber Fort; the unique "lake city" of **UDAIPUR,** with its delicate white marble palaces; the great capital of **NEW DELHI;** and the fabled beauty of the **VALE OF KASHMIR,** surrounded by the snow-clad Himalayas. **PERSIA** (Iran) includes visits to **PERSEPOLIS,** the great royal capital of Darius and Xerxes in the 5th century B.C.; and **ISHFAHAN,** the fabled city of the 15th-17th century Persian Renaissance, with its palaces, gardens, bazaar, and famous tiled mosques. Outstanding accommodations include hotels that once were palaces of Maharajas and luxurious houseboats on Dal Lake in Kashmir. Total cost is **$1636** from New York.

SOUTH AMERICA

31 DAYS $1599

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An original itinerary which takes unusually full advantage of South America's great scenic and cultural attractions. The trip descends along the West Coast, dominated by the towering Andes and filled with the churches and mansions of 16th and 17th century Spain, and returns through the modern cities and lush scenery of the East Coast. Stops include Spanish colonial **QUITO,** with the nearby Indian market at **AMBATO** and a drive along the snow-capped peaks of **"VOLCANO ALLEY";** Pizzaro's great viceregal capital of **LIMA;** the ancient city of **CUZCO** and the fabulous "lost city" of **MACHU PICCHU;** lovely **SANTIAGO** in Chile; cosmopolitan **BUENOS AIRES,** the continent's largest city; **BARILOCHE,** in the beautiful **ARGENTINE LAKE DISTRICT;** spectacular **IGUASSU FALLS** (largest in the world); the sun-drenched beaches of **RIO DE JANEIRO** (considered by many the most beautiful city in the world); the quaint and historic town of **OURO PRETO** (so revered by Brazilians that the entire town is preserved by law as a national museum); the striking contemporary architecture of **BRASILIA;** and **PANAMA CITY** with the Panama Canal, Spanish ruins, and free-port shopping. These great points of interest are complemented by an assemblage of South America's truly outstanding hotels. Total cost is **$1599** from **New York.** Special rates from other cities.

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the Executive Committee's Commendation, in the form of a bookplate. Dr. F. Karl Willenbrock, President of I.E.E.E., made the presentation, and was joined, in the commendation, by John W. Wight, Vice President of McGraw-Hill Book Company. The Tenth Edition is massive, and the effort that went into it was also massive. Don used a team of 116 men (and women) in preparing this book, and every one of them was an expert in his particular field of endeavor. Don, it is always a pleasure to report such an item. It shows, if nothing else, that a few of us were paying attention way back 35 years ago, and you surely were one of them. Please accept our sincere congratulations.

An Alumni Fund capsule from our *Wilbur B. Huston* comes to our attention. Now, I have his picture for the 40th bulletin board, so I will have to find an excuse for writing him. Wilbur says that the is leaving shortly for California (February 15) for the launching of the Nimbus B2 Weather Satellite, a happening scheduled for early April at the Vandenberg Airforce Base N.A.S.A. pad. Wilbur hopes to find time enough to visit with Clint Backus who is in real estate in southern California. Right he is; Clint lives in Los Angeles. Golly, maybe I should write to Clint, rather than Wilbur. I do wish that more of you characters would send the Alumni Association a 25 dollar bill at least once a year, with the Secretary's capsule message attached. That scheme would bring me a heck of a lot of news of many, and you all would then be readers of the *Review*. Gee! That would really be utopia. Thanks, Wilbur, I might just get to dropping you a line.

It is not too soon to repeat an earlier request. We need several copies of the Class of 1933, 25th Reunion Book, usually called "Goodridge" as Ed was the moving spirit. If any reader has a copy that he can spare, as a gift to the class, or for loan to the Committee, will he please send it to either Jim Turner, or Ellis Littmann, Chairman of the 40th Reunion Gift Committee. The book is indispensable for the work that Ellis has to do, so please, please, break down and do something for others, this once. Bob Kimball told me once that they had printed over 600 copies, and had sold most of them. Again, fellas, please.

From my old stamping grounds in Cleveland comes a fine reply to one of my cards (return system) from *Richard Faldetta*. Dick tells me that he belongs to the Ridgewood Municipal Golf Course, where our company used to hold a Saturday tournament each year. It used to be a privately owned, semi-public course, and a dang good one. I had to travel almost 20 miles from my house to get to it way over past the west side, in Parma. Dick is with N.A.S.A. at the Lewis Research Center, in the Facilities Engineering Division, where he is Head of one of two Electrical Design Sections. They prepare designs for research Engineers to install their test setups. For recreation, Dick and his Mary Kay play golf together, then Dick goes on to motor cycling, swimming, and tennis, these supposedly by himself. He is active in the American Legion, the Holy Name Society, and the Elks. Besides golfing, Mary Kay is very active in the "Great Books Program" for school children, and also in the Legion of Mary. No time waster, this Dick, the Faldettas have five children. The eldest, Shelley, is a graduate of St. Mary of the Springs College, Columbus, (now Ohio Dominican) and is teaching in the Junior High School of Providence R.I.; Jane, 18, is a senior at Royalton High, and has been accepted at Ohio Dominican starting September next; Steven, 16, is a soph at Royalton High and is a mechanic, and football player; Neal is a sixth grader and, of all things, plays the trombone. Dick must be quoted here. "One of these years I am going to make a reunion, and see all you great guys. [He must mean me.] What a blow to our class to lose our Goodridge." Dick, you won't ever know how much I miss the guy. Folks, I have no intention of repeating every mention of *Ed Goodridge,* but, I do reserve the right to mention him when a Course VI man comes through, or even any close friend of Ed's. And, Dick, you are a marvel. I'd like to get a pen like you use for making with the message on a postal card. You got as much on the card as would fill an 8½ by 11 of my writing. Thanks a lot and indeed, Dick, for your taking a few minutes to fill us in on the Faldettas of Parma. I expect that you know that Parma was named for a city in the old country, whence comes the cheese Parmesan. There are very few reunions left. Ellis Littmann will call your kind attention to the next one, 40.

I see by the papers that Ellis is running for some Institute Corporation Office, unopposed, hence I hope that he makes it. I dunno but what I like them Russian ballots, where one needs not think. In spite of that which has gone before, *Beau Whitton* writes on that the Mediterranean trip is off due to illness in the immediate family, so will vacation in May in the States somewhere. Try New Hampshire; its always vacation time in God's own country, Beau. Beau goes on to sell me on the idea of representing President Johnson of M.I.T. at inaugural ceremonies at other colleges. He did just that at Catawaba where ever that might be, academic gowns, hoods, et al, marching music, speeches, etc! Beau was really impressed, it seems. Well, I guess that the academic gown is seen only on such occasions, but hoods, heck, Chicago is full of them: music, wonderful, speeches? I feel cold. Many thanks for thinking of us, Beau. And, we are all sorry that you will miss the trip.

Well, well, another Veep shows up, but good, Willie, the Harp, Harper, of Texas, Doctor or Professor to you. By Golly. William does well, making like a philosopher. He starts off by telling me that his little woman is named Bobbie, not Bobby! Further, he is no homo. That is really novel. You spell it with five letters and it is porno, but with six, it becomes normal. Now, he may be right, but he hasn't always been, so I will proceed to differ: arguments from the floor, Bill. Under "Observations," Bill asks that we include the fact that our class was a top notch depression baby, and we were handed nothing on the proverbial platter when we took the bunting from Doctor Compton. Then, Bill mentions the many of the class who have reached and in some cases, passed the top of their respective piles. (William, would not heaps be nicer?) I do believe that Bill's thesis is that it did us no harm to graduate at a time when no one wanted an engineer except to run one of *Eddie Miller*'s boilers; it is just so. Bill's further philosophy includes a real (and fancied) comparison of a present situation, where things are too easy, with the Decline, and eventual Fall of the other famous Empire (says Gibbon).

Now, Bill comes thru with something I've been asking for all along, a biography. So, no arrests, convictions, or even travels. Whadda dull life! But, he has a new Thomas organ, and is teaching Bobb(ie) how to play it. Heck, William, I thought all you hadda do was wind it up like a coffee grinder and put a monkey on top. There, further, is the Harper boat; no mention of what or how. Then, God bless our collective souls, William built a large room on the back of the house which is the railroad system, standard and HO gauges. It turns out that Bobbie has a B.S. degree, but her wiring diagram is a joy to behold, its so different, and capable of scaring the oats out of ya. To go on, the system is 500 feet long on a 9 by 9 table. Gee, Bill, the RR is not extraordinary, but a 9 by 9 table is, so send us photos of the table. It appears that William keeps Bobbie busy, what with the organ, the boat, train, and, mowing a full acre lawn. Bill just keeps busy. Just to emphasize how tough things are (see part about Nero), Bill has just turned in his 68 Cadillac and bought an Olds front drive. Golly, really hard going. To polish this off Bill says, with a home that has everything (down with de Bosses, comes the Revolution), why travel, when it is all right there. He must mean scenery (ever been to Galveston Bay?), ice skating, skiing, and cricket by Jove. But in all seriousness, for once a day, many sincere thanks, Bill, as we do appreciate your giving us the time to write as well as the good story. Other seven Veeps please emulate.

I mentioned, in a former column, that Courtenay Marshall, of Maxwell, Texas, had every intention of taking in the Mexico City 21st Annual Fiesta. Well, sir, he did register, paid his $120 for himself and good wife, apparently drove to Mexico City, and, the day before the Fiesta started, Mrs. Marshall came down with what we have been, facetiously, calling the Mexican disease, an intestinal disturbance of no mean proportions and generally of one day duration (though minor complications may push it into almost a week). Court even went to the University Club, to register, then quietly disappeared. I looked for him in vain,

with no comfort found in the fact that he had been there. So, after all the planning, the poor guy missed a swell party. I hope that the illness does not keep both of them away next time around. I got the stuff first time, but have never been bothered six more times, as well as other trips to Central and South America. I know that Brenda will forgive this small lapse, in the best interests of International Health! The Swiss make a fine preparation called, "Entero-Vioform," a medium sized pill used both as a preventative and cure. Directions say to start using the day before you get to the Mexican border, and continue until piece of mind is attained. The E-O is licensed to be made in Britian, and that is where I got it. Lately, I find that it does good just having it along, even if you don't take it. But don't eat green vegetables and take care to see how the waiter carries the soup, especially his thumb. So, so much for Court at the Former Court of Maximillian and Carlotta.

As I live and breathe, here is another photo, this of Court and family, for the 40th display. Still about 33 to go and I have written to every dang one of those ungrateful so and sos. Here is a new one. Fifteen years ago, the two Marshalls counted the money, decided that they had enough, went to Barbados, built a mansion, and proceeded to live it up. Then, when the island decided to go it alone, they wanted the Marshall "lean-to" for a home for the brand new Prime Minister. So they sold it and, of all things, went back to Texas, near Austin, bought a hunk of property and went into pecans and Hereford cattle. This last, of course, might be subject to discussion (we have Angus). Conflict with the I.R.S. appears to have discouraged the Marshalls and they dropped out of the Hereford business. Heck, I ran along 15 years before they discouraged me, and, they didn't even get that much satisfaction. Mine went to within two days of Tax Court, and then the I.R.S. came in looking for a settlement. Ask me the details, anyone, and you can have them, but not here.

The Marshall eldest son is in the real estate business in Washington, D.C.; the second son is a lawyer, and the third and youngest is a graduate chemical engineer (like Dad), but not from M.I.T. (unlike Dad). He is getting set to go to Vietnam, as a private in the Field Artillery. The only daughter was a school teacher until marriage, and now is living with hubby near San Francisco. Court finishes by suggesting that I (me) persist in living a long time, as he likes the gossip. Gosh, that makes two, but I can't recall who the other one was.

I have just returned from a Boston and New York City trip. At Boston, I attended the Alumni Council dinner at the Faculty Club; saw *Bill Barbour* briefly and had dinner with *Westy Westaway.* Now, there is a man of few words. I can get a story out of him, but I have to be armed. That is no place to try for class news. The speakers text is printed in the *Review* much before these notes can make it, so I agree that the Council is, indirectly, a great thing for disseminating information of a policy nature from the Institute to the class, or, as M.I.T. sees it, from them to the alumni. One gets to meet many alumni of other classes; all influential men in the classes. One classmate asked me if there were questions from the floor, and yes, there were, though not as potent as they ought to have been. I never did find out if our worthy demonstrators, so daintily handled, are all candidates for a degree at M.I.T. If not they are a well controlled and behaved crew. After the Council meeting, I spent two full days and nights in New York City, and, with the help of my Metropolitan Manager, *Guido Garbarino,* I had lunch April 2, 1969, with three most congenial classmates, at the Chemists' Club: *Newland Smith,* Assistant to the President of Visual Electronics Corp.; *Don Fink,* General Manager of the I.E.E.E. and *Werner Bachli,* specialist in export marketing, International G.E. So, there I was surrounded by electrical engineers. By fumbling around and missing the point a lot, I did find out quite a bit about how these brain children live. Heck, they are just like other people, a bit more noisy, maybe. In these small, or even the larger meetings, I do not try to take notes. I just ask, on paper, for the info and hope to the Lord I get in in time to remember who the guys were in the first place. I still need Werner's photo and that might come in time for the remainder of his message to be used in the July issue. Facts are we really talked things over, even as I realized that I did not know *Newland Smith* as a student, and knew Don, and Werner only slightly, and then through Ed Goodridge and the like. Guido could not make the luncheon, so we met at the New York Athletic Club for dinner, complete with Guido's great little wife, Mary. What a pair they are. Mary listens to Guido's tall tales intently, then tells me that she pays no attention to this raving, et al. Again, we had a fine dinner in the upstairs dining room. Garb says that he doesn't belong to the Club as he cannot afford it, but two of his sons do, which got all of us in. It is my fond hope that one of these days I can visit with this unique family, Garb, Mary, one daughter and seven sons.

Egad! I forgot to mention that I would make a brief story of how I got into the Angus breeding line. The head of our firm had a set of three farms east of the City (Cleveland); a hog farm, a milk farm, and a commercial Angus breeding and feeding farm. I ran it for a while during the war and after the war was over made a purchase of 10 or 12 rather good commercial females; I sent them by freight to Exeter. The Exeter place was all prepared for them in advance. I kept the commercials for two years, doubled the money on them, including the expenses, and turned around and bought pure bred females, complete with a non related bull. That's it, Don, Newland, Werner; now send the Alumni Association no more than 500 clams each; no more now!

Now comes *Ivan A. Getting* with a short and excellent note on Aerospace stationery, President, yet, with a photo. Gee, is this guy that good looking? So I paw over the 25th Goodridge and find Ivan, and the pictures were not taken by the same man, but though different, he is good looking. The main point is that Ivan replies to the card, and sends in his photo to complete, partially, the file for future display at the 40th. Ivan, the file is not complete, see the last paragraph of this column. Ivan says that he has but very little news about the Getting clan. However, that beautiful daughter (see the 30th notes) has presented them with their third grandchild, their first grandson. Ivan has two more boys working on this project. I must quote "while this was great news to us, I am sure that it is old hat stuff to the other members of the class." Since when did this become "old hat" to any of you characters? I must repeat that you chaps had quite a lot to do with childrens' production but nothing whatever with the grandchildren. You are all over rated so far as the next generation goes. Ivan, we are proud, as are you folks, that you do have that third one. Don't let any of these other braggards disturb you. Now, lest we miss the main point, Ivan wrote me, which is more than most of you have done. So, my most sincere thanks, Ivan. Heck, you always have come through, and you always have replied to the mail.

Deceased

Another of us has passed to his reward, in perhaps a much better world; *Walter Oppen,* Course VI, of Plandome, N.Y. Though Walter passed away last October, we make it a practice to write a note to the widow, in each case, if we know where to find her. I discovered that Mrs. Oppen still lived in the same home, so I did write and received back a fine note, direct from the great heart of a woman who loved her husband dearly, and lost him. She made this very evident in her note. She said that Walter retained his remarkable mental agility right up to the end, having taken a masters in physics from Adelphi in 1965. Any one match that? The Oppens had three sons, and Mrs. Oppen says that they have been and will be a great comfort to her. Well they might. "Thank you again for writing. I deeply appreciate it," signed Henrietta Oppen.

Fellows, this is serious business. I hear from Mrs. Oppen almost a half a year after Walter passed on. In a time of great sorrow, many things are not done that should be, though not purposely. At the risk of seeming morbid, either you or me, let me say what I have done. Leona and Phyllis have been asked to notify many people, and entities, of my passing when it occurs, by whoever survives, using the telegraph and the same exact wording, at the expense of the estate. The Alumni Association of M.I.T. is one of those entities. I know that some wives, and less men, will not even dis-

cuss such matters, but, they do come up, and it is inevitable. The Alumni Association ought to know of the passing of an Alumnus within hours. Anyone wish to make the effort? Further, no matter how much time has elapsed, the widow always loves to hear from classmates, and almost always replies, so when you hear about the passing of any personal friend, it would be a fine gesture were you to drop the widow a line. You will be greatly surprised to find that you feel just a little bigger than you did before.

We have several address changes: *Jose B. Calvo,* Course IV; Professor *Frank F. Gilmore,* Course XV, *Leon Hyzen,* Course IV; *Nicholas S. Kallelis,* Course I; *William L. Scarborough,* Course X-A. These new addresses are in our card files, and any who write for one or more will be most welcome to the information provided that the request is accompanied by a short family and personal biography.

The following men have still not sent in 35th photos, or reasonable facsimiles: Bachli, Bell, Bradley, Brashears, Britton, Brookfield, Lawrence Brown, Carbonell, Duntley, Garbarino, Hapgood, Henning, Hodgdon, Johnson, F. Kincaide, Lindsay, Longley, Rhodes, Richardson, Roetting, Ray Smith, Viita, LeB. Webster, Welch. Still far to go, Ivan.

Our monthly mention of the 40th comes next and last. The 40th is the last important reunion. It will be held at Chatham Bars Inn, just as was the 35th; Ellis Littmann is the 40th Fund Chairman, and, a good one. In these pages, if I survive, you will read about it 25 to 30 times. You will see more elsewhere, if *Jim Turner* and Ellis have their way, and put your money on "will get it." That's all, for now, my good folks. All I need is gossip, photos, and personal visits, no matter where, Exeter, Florida, or in your town. I will come to see a small group if y'all ask me.—*Warren J. Henderson,* Secretary, Drawer H., Exeter, N.H. 03833

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In the class notes of the January 1969 issue of the *Review* you read *Jim Eder's* "Experiment in Blackmail." Two names were mentioned to be "set down for public scorn" unless they answered Jim's plea for news. No news concerning these two classmates has since appeared in print, and I now take full responsibility for this horrendous oversight. They are not to be pilloried as threatened. My sincere apologies to both men for this belated recognition.

First, from Colonel *Carlton J. Cook* a long newsy letter, which is condensed somewhat in this column. After graduation, Carlton married Jeanette Westcott of Binghamton, N.Y., and they now have a son, Charles, and a daughter, Louise. In 1940 Carlton went on active duty under his reserve commission, received at M.I.T. as a 1st Lieutenant. After six years he retired from the army with a full colonelcy. During the World War II period he was in Louisiana, North Ireland, England, North Africa, and ended his active service as commanding officer of San Jacinto Ordnance Depot near Houston, Texas. Carlton retired from the reserve in 1958 to pursue his present vocation in education. After a year at the State University of New York in Binghamton, and more than a year at Purdue, he received his M.A. in mathematics. He then went to High Point, N.C., to teach at High Point College, and was Chairman of the mathematics department for eight years until his move to Seneca Falls, N.Y., in the summer of 1968. There, he joined the newly established Eisenhower College as head of the mathematics discipline of the Division of Natural and Physical Sciences. This is a new liberal arts college, named for the late President Eisenhower, with his blessing and backing, having a four year curriculum with eventual enrollment of about 1,500 students. During the intervening years Carlton and his family have done considerable travelling, including Hawaii, Japan, Taiwan, Philippines, Hong Kong, Cambodia, Thailand, Malaysia, Singapore, Indonesia, and Borneo. Carlton's impressions and recountings of the many countries visited are extremely interesting, but I gather from reading between the lines that he is in love with Hawaii. He mentions particularly Kona Village Resort on the west shore of Hawaii Island, just north of Kailua Kona, and also Hanalei Plantation on the west side of Kauai Island. The latter is built on the site of the setting for "South Pacific."

Carlton and his wife now live at 108 Garden St., Seneca Falls, N.Y., 13148. Early in 1969 they plan to build in the area, "with a guest room empty and waiting to be filled" by any classmate that may wander by. Carlton and Jeanette plan to attend our 35th reunion, when they look forward to meeting classmates. I am sure that reservations for the guest room may be made at that time.

Secondly, *Christian E. Born* sent another fine letter. Chris spent his undergraduate years at Dartmouth (and was his class alumni secretary for a time) before joining our class as a "special" student. He did not get to know too many of us because most of his architectural courses were in the Rogers Building on Boylston St., in Boston, with only calculus and mechanics courses in Cambridge. After graduation he "veered off into airport design because" he discovered, as a pilot, "that airports at that time were so lousy that something ought to be done about them." Thereafter he went back into architecture in Boston, got married in 1936, and became a partner of Groton & Born, Architects. World War II ended that, and after four years of service, he returned to airport design and maintenance. In 1955, Chris finally got into the field that he wanted in the first place—teaching. He became a staff member of a country day school in New Haven, Conn., which turned out to be "the most wonderful and most satisfying experience of my life." Chris is now retired, his three children are on their own, and he has a camp on Moosehead Lake in Maine and an apartment in Hamden, Conn. From these bases, Chris and his wife travel and do the many things together that they put off while working and bringing up children. It would be wonderful to see Chris and his wife at our reunion, but if they cannot make it—good luck.

A short time ago I received from *Henry N. Andrews, Jr.,* (Ernie) a personal letter and an extremely interesting account of a trip taken into Newfoundland to look for fossil plants. Ernie, as head of the botany department at the University of Connecticut, requested that I not make his account public, which I will not do, but as his undergraduate mountain climbing partner, I groan and ache! I would hope to see Ernie at Martha's Vineyard at out reunion, but barring that I hope to visit him in New Hampshire after the reunion. Maybe, with his permission, I can pass along detailed accounts later.

And then there is *Frank* "Choo-Choo" *Moore,* a steam locomotive man to the core. Late in 1968 we received a letter from him written on Garuda Indonesian Airways stationery. At that time he had been in Indonesia for about a month as a consultant to A.E.D. on the subject of "d—n diesel locomotives, the most hated things in the world." Actually, Frank admits that this is the most interesting experience, with one brief exception, that he has had since leaving Baldwin Locomotive in 1946. He inspected the Indonesian State Railway facilities, and saw some 2-12-2-T's, some 4 cylinder balanced compounds on the 42" gage, and some old 2 cylinder locomotives with inside cylinders (once common in England) but which he had never before seen on narrow gage. He visited the Bourabadoon, a Buddhist structure of about 700 A.D., and the Prubanium Temple, a Hindu structure of about 800 A.D. Frank does not care for Diarkata, except for the Zoo, about 12 miles out, where they have 3 Varanos Komodansis, the first he has ever seen. (Me, too!)

Frank thinks that the airplane is the world's worst means of travel. He says that they treat you like cattle, and nearly starve you to death, with 2 to 4 "waitresses" to 70 to 100 people. All that I can say to Frank is to come back to the States and try a couple of swinging airlines with which I am acquainted.

Save money—grow rich

After his graduation, *John W. King* has been in the real estate business, as well as being the author of several books. His latest, *Save Money and Grow Rich* has recently been published and according to the critics, is well worthwhile. It covers hundreds of hints for saving time, energy and money. To you who may have had trouble in these fields, read what John has to say about the subject. It is said to be the first and only book of its kind—an encyclopedia of ways to save time and money, and to be happier. I understand that the book is available at the larger bookstores everywhere.

Ralph Brown writes, "Moved from Attleboro in 1964 after 12 years of general practice and spent 3½ years at Wesson Memorial Hospital, Springfield, in the Emergency Room Group. Missed patient care so much I joined a hospital-based group at Wing Hospital, Palmer, and we now have a growing community care program—and I'm Staff President. Wife Ann teaches first grade in Hampden, Peter, 12, is in the seventh grade and Ralph, Jr., 22, has 1½ years at M.I.T. in M.E." . . . *Bill MacDonnell* has been honored by his election to the newly formed National Academy of Engineering. Bill is currently President of Kelsey-Hayes Co., and also a member of its Board of Directors. . . . *Kelsey Saint* has been elected president of the Construction Specifications Institute for 1968-69. He is a partner of the architectural firm of Meyer, Ayers, and Saint of Baltimore, Md.

Jean Raymond represented M.I.T. at an official function of Queens University in Kingston, Ontario. . . . *George Priggen* filled us in on his recent professional activities with Mobil Oil. From 1958 to 1963 he was General Manager in Kansas City. From 1963 to 1964 he held the same position in New York. From 1964 to 1965 he was Manager of Planning and Development in New York from 1965 to 1967, he was Coordinator of Corporate Identity. He has been since 1967 and is currently Marketing Manager for Mobil Latin America and stationed in New York.

Charles MacFarland tells us that his son Charles, who also graduated from the Institute, is now serving in the Peace Corps in Malaysia. . . . *Gillette K. Martin* a retired Senior Vice President of Merrill Lynch, Pierce, Fenner and Smith was elected a director of Foote, Cone and Belding, one of New York's leading advertising agencies. . . . *Andrew T. Dempster* retired in 1966 from the Bureau of Sanitary Engineering, Department of Health, City of Detroit and is now Project Director, Waste Water Technology, National Sanitation Foundation, Ann Arbor, Mich.

The January 1969 issue of the Brown *Alumni Monthly* has reference to *Mal Stevens,* Vice President for Administration, in a discussion on athletic policy at Brown. . . . *John Hrones* authored an article in *Engineering Education* on "Information Systems and the Higher Learning." . . . *George Best* has been named technical director of the Manufacturing Chemists Assoc. Congratulations to *Jerry B. Minter* who has been elected a Fellow of the Institute of Electrical and Electronic Engineers as of 1/1/69. Jerry is cited for "contributions to radio signal generating and measuring devices." . . . *Ralph Ranger* now has five grandchildren. He is Product Sales Manager at Sylvania, Exeter, N.H. . . . *John Troxell* is located in San Francisco as Vice President-operations for the Ben C. Gerwick Co., Contractors and Engineers. They are part of Santa Fe International Corp. *George Fowles* of B.F. Goodrich Chemical Co., is quoted in *Chemical and Engineering News* in the area of intelligent pricing for thermoplastics.

Deceased

We learned recently of the death of *Francis Mahoney* of Marlboro, Mass. We extend our sincere sympathy to Mrs. Mahoney.

For the information of their particular friends, here is a list of up-to-date addresses of classmates since the 1967 M.I.T. Register was published:

Samuel Untermyer, II, 444 Lassen St., Los Altos, Calif., 94022; *Robert M. McIver,* 2260 Eastridge, Menlo Park, Calif., 94025; *Burton Williams,* 6840 South Shore Dr., Chicago, Ill., 60649; *James M. Farrin,* Aerojet General Corp., Ses Programs, 9100 E. Flair Dr., Elmonte, Calif., 91734; *Jon M. Lazear,* Rt. #2, Box 105-A, Baltimore, Ohio, 43105; *Russell D. MacDonald,* 471 Silvera Ave., Long Beach Calif., 90814; Dr. *Alexander M. Blakely,* 12858 West 26th Ave., Golden, Colo., 80401; *Gerhard Ansel,* 518 Oak Dr., Lake Jackson, Texas, 77566; *Wolfgang F. Rahles,* 10806 Jaycee Lane, Houston, Texas, 77024; *William W. Bentley Jr.,* 1047-D Courtney Dr., Dayton Ohio, 45431; *Charles E. Mack, Jr.,* Midlane South, Syosset, N.Y., 11791; *Milton P. Mindel,* Department of Army Engineering, Ohio River Division, Box 1159, Cincinnati, Ohio, 45201; *Henry Regnery,* 70 East Cedar St., Chicago, Ill., 60611; *Harold E. Thayer,* 48 Portland Dr., St. Louis, Mo., 63131; *Charles A. Cogan,* 1701 Central Ave., Whiting, Ind., 46394; Colonel *Daniel F. Shepherd,* 7604 Peacock Dr., Huntsville, Ala., 35802; *Paul Nichols,* 7100 North 3rd Ave., Phoenix, Ariz.; *Draper W. Williams* 290 Winthrop Ave., Elmhurst, Ill., 60126; *Peyton G. Cooper,* Republic Nat'l Bank Tower, Dallas, Texas, 75201; *J. Adron Troxell,* 155 Jackson St., Apt. 1807, San Francisco, Calif., 94111; Miss *Melvina L. Palmer,* 920 Park Ave., Apt. 318, Beloit, Wisc., 53511; *Hubert H. Swanson,* 2893 Knox Ave., South, Apt. 316, Minneapolis, Minn., 55408; *John J. Harman, Jr.,* 715 Laurel Ave., Apt. 105, San Mateo, Calif., 94401; *Kendrick H. Lippitt,* 23830 Audrey Ave., Torrance Calif., 90505; *Robert B. Gow,* Oklahoma Gas & Electric Co., Ardmore, Okla., 73401; *Frederick O. Hutchinson,* 6628 Southcrest Dr., Edina, Minn.; *Arthur L. Conn,* 5000 East End Ave., Chicago, Ill., 60615; *Ivar W. Malmstrom,* 120 Lynbrook Ave., Point Lookout, L.I., N.Y. 11569.

I hope that this up-dating will reunite some of you, at least by the written word. And that is more than your secretaries can get, or do receive.

By the time that you read this issue of the *Review* it will be only a few days until our 35th reunion at Martha's Vineyard. I sincerely hope, as do the remainder of your classmates, that all of you can join with us for a weekend of fun and reminiscing.

Paul Wing, our 35th Reunion Chairman reports that we now have over 140 people coming to Martha's Vineyard, June 13th to 15th weekend—it looks like a great turnout. I missed all of the reunions until the 25th—and will miss no more.— *W. Olmstead Wright,* Secretary, 1003 Howard St., Wheaton, Ill. 60187; *Norman B. Krim,* Secretary, 15 Fox Lane, Newton Center, Mass. 02159; *George G. Bull,* Assistant Secretary, Mid-Atlantic, 4961 Allan Rd., Washington, D.C., 20016; *James Eder,* Secretary, 1 Lockwood Rd., Riverside, Conn. 06878

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We have a nice newsy letter from *Arthur Haskins* which reads: "This is my 24th year with the Bath Iron Works Corporation, Bath, Maine. These years are split into two periods by ten years in business for myself in New Hampshire. I now hold down the position of Manager, Planning and Estimating. The people in my division are divided into four departments: Planning, Estimating, Direct Labor Control, and Industrial Cost and Control. Having been appointed to the position only in April 1968, and having previously been Machinery Superintendent, I am still learning and reorganizing.

"My son, Daniel P., a graduate of New Hampshire University with a masters at M.I.T., is head of the Mechanical Engineering course at Franklin Institute, Boston. My daughter, Carolyn, a graduate Gorham State Teachers College, Gorham, Maine, is now taking her masters at Colorado State University, having taught for six years in Maine and Colorado since graduating from Gorham. Neither Dan nor Carolyn is married. My wife, Doris, and I are living here in Bath in the house that we built after coming back in 1955."

From *Chester Bond*: "My wife, Ellen, and I are now proud grandparents as our oldest daughter, Ellen, gave birth to a daughter in October. The child's name is Ellen Elizabeth; the child's great grandmother is, of course, named Ellen Frances and well into her 80's. My wife is Ellen Margaret and our daughter is Ellen Kathleen. They did vary the middle name, but each was the oldest in her generation. How's that for a line of queens in a feminine dynasty? Who says women don't have power?"

J. A. Bradner is now Vice President of National Executive Search, Inc., Cleveland and Professor *George E. Valley* of M.I.T. physics department has been listed in *American Men of Science.* . . . *William L. Abramowitz* has been appointed to the Board of Governors of Hillel Academy, Swampscott. . . . *William W. Cross,* International Division Vice President of Kimberly-Clark, has been named a Director of that company. Bernard Berger, on leave of absence from the University of Massachusetts, where he was Director of the Water Resources Research Center, will become a staff member concerned with Water Resources Research in the Office of Science and Technology. . . . *Elmer J. Roth,* of Simsbury, has been appointed Vice President-

Controller of Fafnir Bearing Company, a Division of Textron, Inc. . . . *Cornelius Verhagen* has been cited for contributions to the development of interest and education in the field of instrumentation and control by the Institute of Electrical and Electronic Engineers, and elected to the grade of Fellow.—Co-Secretaries: *Phoenix N. Dangel,* 329 Park St., West Roxbury, Mass. 02132; *Irving S. Banquer,* 20 Gordon Rd., Waban, Mass. 02168

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Hopefully we will see many of you in Cambridge for Alumni Day (Homecoming) on the 16th. . . . *Bob Gillette* has been elected Chairman of the Board of Directors of the National Life Insurance Company. He continues as President of the Rock of Ages Corporation.

I regret to report the death of *Morgan Rulon* last December 29. To his family the class extends sincere sympathy.—*Alice H. Kimball,* Secretary, 20 Everett Ave., Winchester, Mass. 01890

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Ed Peterson has left Birdsboro Corporation to become a consultant on steel rolling mills. . . . *Harry Crapon* is now with Ingalls Shipbuilding Division of Litton Systems, Inc. . . . *Paul Allen* has just finished four years residence in Perth, Australia, as general manager of Goldsworthy Mining Ltd. He is now in Los Angeles, Calif., as vice president of Cyprus Mines Corp., and as president of its subsidiary, Pima Mining Co. With his wife Marjorie and their three children, Paul is living at 1515 East California Blvd., Pasadena, Calif.

Murray Manos has recently been made Associate Department Head of a new department, Sensor Systems Analysis (D-84) of the MITRE Corp. . . . *Bob Thorson* is still president of Thor Roofing Company, Inc., Medford, Mass. He was recently elected president of the Medford Rotary Club. Bob is also a director of the Medford Chamber of Commerce, Hillside-Cambridge Cooperative Bank and a cooperator of the Medford Savings Bank and the Lawrence Memorial Hospital, Medford.—*Robert H. Thorson,* Secretary, 506 Riverside Ave., Medford, Mass. 02155; Professor *Curtis Powell,* Assistant Secretary, Room 5-325, M.I.T., Cambridge, Mass. 02142; *Jerome Salny,* Assistant Secretary, Egbert Hill, Morristown, N.J.

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Don and Phyl *Severance,* my bride and I represented the class at the 21st annual Mexican Fiesta in March. Our Mexican alumni put on a great show, and we strongly urge that you plan for a '38 class reunion in Mexico City next March.

Some other classes have been doing this with great success.

Ed Hadley and I attended the M.I.T. Club of Northern New Jersey Wellesley Night at which it was duly announced that Charley King had that day renewed his membership, from Paris, France, which is somewhat remote for an M.I.T. local club. The point is that this membership from Charley brought the club to its all-time membership record.

Cliff Nelson writes: "My wife, Jane, and I are leaving for a sabbatical year in the Cardiology Department of the Royal Melbourne Hospital. Regular job is full-time research at Maine Medical Center, Portland, with a Research Career Award from the National Institute of Health. We are planning to stop off in Hawaii and Japan on the way out, and will come back the other way, stopping at Athens, Teheran and possibly other cities in that area. Our son, Lars, enters Maine Maritime Academy this fall. Also I am active on ham bands, call W1IDA. Jane is remedial reading supervisor in school district here."—*A. L. Bruneau, Jr.,* Hurdman & Cranstoun, 550 Broad St., Newark, N.J. 07102

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From *Newsday* (Long Island, N.Y.) we note that *Dave Nichinson* has resigned as President of Kollsman Instrument Corporation. Quoting from the article by Francis Wood, *Newsday*'s Business Editor: "Nichinson originally went to work for Kollsman in 1945 after serving as a staff member of M.I.T.'s Radiation Laboratory. As a project engineer at Kollsman, whose main plant was at Elmhurst at that time, he helped to develop more sophisticated sextants used on over-the-water aircraft flights. Through his work he was able to advance automatic celestial navigation equipment, contributing substantially to the establishment of Kollsman as the world's largest manufacturer of such navigation gear for aircraft and space vehicles. This, in turn, had a significant effect on the company's growth and profitability. In fact, Kollsman's operations eventually became a major part of standard Kollsman's volume and earnings."

Al Waggoner has been named Vice President of Airborne Instruments (AIL) Division of Cutler-Hammer. He has been Director of Management Operations and Technical Support and will continue in these responsibilities. . . . *Curt Buford* has been elected President of Trailer Train Company of Philadelphia. The firm is a cooperative owned by 39 U.S. Railroads for the purpose of leasing piggy back flat cars and auto-rack cars to the railroads. . . . *Bill Tallman,* who has been President of Public Service Company of New Hampshire since May 1965 has been given the duties of Chief Executive Officer of the company. Bill has been with Public Service since 1946 and was elected Vice President in 1964.

New drafting and design organization

Albert Knight has had several jobs since leaving M.I.T. at Bausch and Lomb, Eastman Kodak, Xerox and at other companies. Al has also had a very big problem, epilepsy. His own disorder has been under control for many years but the lack of understanding about epilepsy in the minds of most people makes life very difficult for epileptics and contributes to the waste of their talents and capabilities. Al writes that he is organizing his own drafting and designing organization at 3694 West Lake Road, Canandaigua, N.Y. Any classmates interested in more information from Al Knight, please contact him at the Canandaigua address.—*Ken Rosett,* Secretary, 191 Albemarle Road, White Plains, N.Y. 10605

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Within a few days after the appearance of these notes, the M.I.T. campus comes alive with voices of the faithful members of the Class of 1944 and other members of their families celebrate their 25th reunion. The 25th Reunion Committee, under the chairmanship of *Burt Bromfield,* met on April 7 at the M.I.T. Faculty Club on Memorial Drive in Cambridge. Mal Kispert, Class Treasurer, reported that $4,160 had been received in class dues, that 91 classmates definitely plan to attend the 25th Reunion on June 12th to 15th and that an additional 151 hope to do so. Another 159 had indicated that they would not be able to join us. Mal also reported that the Faculty Jazz Group has agreed to perform on Saturday, June 14 and John Nichols is confirming arrangements with the Canton Barber Shop Quartet to sing that same Saturady evening. For Saturday morning, Mal had arranged for Ken Wadleigh and Walter Rosenblith to speak for ½ hour each on "M.I.T. Today." *Stan Warshaw,* editor of the Reunion Book, reported that 296 biographies had been received and that he hoped to get another 40 biographies by sending telegrams to the best prospects. *Scott Carpenter* had about completed his activity selling advertising space in the Reunion Book. (At the meeting of the Reunion Committee on March 10, he had reported sales of $700 in advertising space of which $512 had been collected.)

Class Nominating Committee

As secretary I wish to report to you on the status and activity of the Nominating Committee. *Al Picardi* was appointed chairman last January by Class President *John Hull.* At my suggestion and in the absence of any class constitution or by-laws, Al announced via a Reunion Committee letter mailed in early February that the Nominating Committee was completely open and he asked for volunteers. No one except myself came forward and Al dissuaded me from volunteering. Thereafter, he recruited *Court Ames, Scott Carpenter, Jack Frailey, Alan MacLean,* and *Lew Tyree.* As of mid-April the committee had been active for some time and Al was receiving preferential ballots from the committee members after a first round of less formal



W. C. Tallman, '42



W. B. Rodemann, '44



D. D. Brillembourg, '47

name collecting. The election of officers for a five year term will take place at the 25th Reunion. From my study of the 1968-69 Director of Alumni Officer of the Alumni Association, it would appear that the Class still has complete flexibility to rearrange at the reunion the structure of offices such as providing for regional vice presidents or secretaries.

Bulletin: On April 18 Al Picardi was elected President of the M.I.T. Club of Washington, D.C., the third club in which he has held that office.

I wish to thank *Jack Barmby* for writing the May notes. It was good to have news from Chicago of *Lewis Tyree* and his family and of classmates *Peggy Bowles Smith, Ralph Barclay,* and *Page Ufford* who were at Middlebury College with Jack before coming to M.I.T.

Rodemann elected vice president

I have just received a press release directly from the Standard Register Company of Dayton, Ohio, that *Will B. Rodemann* was elected Vice President for Marketing on April 16. Effective May 1 he will head the company's planned expansion in the information processing field. Will has most recently been Vice President for Marketing and a Director of Data Pathing, Inc., Sunnyvale, Calif. (see April notes). He is former Director of Corporate Marketing at Varian Associates, Palo Alto, Calif. From the early days, Standard Register has pioneered in the design and manufacture of business forms and forms handling equipment. Kenneth P. Morse, '26 president of Standard Register, comments on Will's marketing background and knowledge and notes that it will strengthen his firm's approach in the input-output segments of the information processing industry. I have reported earlier that I last saw Will in Arlington, Va., in May, 1966, at a symposium on Source Data Automation sponsored by the National Archives and Records Service of the General Services Administration. Will is the only classmate from whom I have ever received a change of address card or a press release addressed directly to me. Congratulations, Will, and thanks for the cooperation with your *Review* correspondent. *(See photo above.)*

I am looking forward to June 12.—*Paul M. Robinson, Jr.,* Secretary, Information Systems Division, Navy Op-914H, Pentagon 2B330, Washington, D.C. 20350, 202-697-6115 or 7710 Jansen Drive, Springfield, Va. 22152 (note change of ZIP code) 703-451-8580; Assistant Secretaries: *John G. Barmby,* 924 Fairway Drive, Vienna, Va. 22180; *Paul M. Heilman, 2nd,* 30 Ellery Lane, Westport, Conn. 06880

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The mail response has not been as great as I had hoped. Fortunately, however, there are a few who do respond and we are happy to report on them. *Charles Wellard* has written from his company, American Components, Inc., of Conshohocken, Pa. Charlie founded this company seven years ago, a firm devoted to producing components for the space and computer industries. The company has grown into three plants in the United States and one in England. In 1968 American Components was merged with International Silver Company and Charlie continues as President of American Components, Inc.

Bob Goodstein, Course II, has written us a very fine letter from his home in Mercer Island, Washington. Bob is the Manager of the Guidance and Control Technology organization of the Boeing Aerospace Division Technical Staff at the Boeing Space Center at Kent, Washington. His work is on major missile and space weapon systems which is fascinating technically but, as Bob says, unfortunately, appears to continue to be necessary. Bob and his wife have three sons, ages 14, 12 and 8. Recently Bob, his wife and the boys enjoyed a ski vacation at Sun Valley, Idaho. Bob has recommended that the 50th reunion be a skiing reunion. I believe I will have to think about that for a while before adding an affirmative response.

Henry F. Lloyd received his masters degree in aeronautical engineering with the class of 1946. Previously, Henry had graduated from the U.S. Naval Academy and had served with the Navy in both the Atlantic and Pacific in World War II. Following graduation from M.I.T. Henry had several major assignments with the Navy. He was Director of Flight Training at Pensacola, Fla., Head of the Anti-Submarine Warfare Operation Division of Naval Operations, and Commanding Officer at the largest Naval Air Technical Training Center in the U.S. Navy.

Henry retired from the Navy as Captain Henry F. Lloyd, U.S.N., on February 1, 1969 and has been appointed Director of Admissions of Flagler College in St. Augustine, Fla. It will be returning home for Henry who is a native of St. Augustine. Henry, his wife, Monterey, and their four children will reside at 102 Oglethorpe Blvd., St. Augustine.

Harold Jacobson received his S.B. in electrical engineering with the Class and went on to obtain his masters degree in electrical engineering at M.I.T. and a masters degree in business administration at Boston University. Harold has been with Raytheon since 1947 and has recently been appointed technical director of the Poseidon program for the Raytheon Company's Space Division in Sudbury, Mass. Previously Harold has served as project engineer in the Division's Fleet Ballistic Missile Program, as section manager of magnetron development for microwave tube research, and as project engineer for the display keyboard of the Apollo guidance computer. Harold and his family live in Newton Centre, Mass. He and his wife, Marilyn, have three boys, Robert 15, David 12 and Steven 9.

The following classmates are assigned the vital task of reporting their activities for the past years to this secretary. Reply promptly as we badly need material for future issues. *Clarence T. Ford, Edward S. Hill, Nelson O. Lewis, William H. Peirce, Howard V. Perlmutter, William M. Siebert, Robert K. Smith, Marshall P. Tulin, Louis B. Wadel, John U. Weber, Robert L. Whitney, F. W. Pferdmenges, Harvey R. Phillips, and Reuben Samuels.* —*Russ Dostal,* Secretary, 18837 Palm Circle, Cleveland, Ohio 44126

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This is one of those wet, cold and dreary spring days so common to this part of the

country. As I write however I can almost see the grass greening so maybe it's worth it after all. This time of year between the winter and summer seasons is good for very little but traveling South or thru the Islands on vacation which I trust is what some of you are smart enough to be doing.

Our condolences to the Mellgren family of Metuchen, N.J. *Svante Mellgren,* who received his doctorate in Course III with us, died January 9.

David Brillembourg writes: "I am now President of the *Colegio de Ingenieros de Venezuela* which is the professional organization to which all Venezuelan engineers belong by law. We are more than 8,000 registered members of all branches. At this moment we are very busy organizing the 8th Venezuelan engineering congress."

Congratulations are in order to prexy *Claude Brenner* on his marriage February 25, in London, England. That is not a typographical error; Claude writes to say that he married Mary Spencer, formerly Mary Brewer of Welwyn Garden City, Hertfordshire. Let me quote from Claude's letter. "Actually I suppose you can say I married the kid next door 20 years later, as Mary and I first met in the Garden City when I was working at de Havilland Aircraft Company in 1948 and 1949, and I was living in "digs" in the house next to Mary's family. I had kept in touch with the Brewers over the years, and saw them from time to time on various trips to England.

"Mary and I met again last year and after a rather involved trans-Atlantic courtship, and insane telephone bills, we were married last month. We have two children, adopted in Mary's first marriage. Paul is seven, and Harriet, five. We spent our honeymoon here in Cambridge right after the violent February and March blizzards —Mary thought she was in Alaska after the English winters. She has since returned to England, to settle her affairs, get visas for the children, and so forth, and I am impatiently awaiting their return in early May. We will move into a larger apartment at 100 Memorial Drive, and eventually emigrate to the suburbs, I suppose. I look forward to introducing Mary to all our classmates at Alumni Homecoming on June 16. All the best, Claude."

It doesn't appear that I will be in Cambridge this June, Claude, but Gina and I wish you and Mary the best. Claude, as far as I know, was one of the few remaining bachelors besides Gabe Ciconne. Are there others still enjoying the simple life of bachelorhood?—*Dick O'Donnell,* Secretary, 28516 Lincoln Rd., Bay Village, Ohio 44140

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Paul Weamer has lived here in Needham for quite a few years. He has an attractive home in a nice neighborhood and so far as anyone knew had no reason *ever* to think of leaving. Paul, Ginnie, and the children speak only English but this has been no handicap since it is the native language of Needham. With this as background, guess what! The Weamers are moving to Argentina! Just like that! Where everybody speaks Spanish!

Fearing that Paul had a bad case of misaligned marbles, I gave him a call last night (April 20). He had just that very day returned from Buenos Aires which he said was one of the most beautiful cities in the world, second only to Rio de Janeiro. Here's the story. Paul recently joined Neal Mitchell Associates in Cambridge, an architectural and consulting firm, where his expert knowledge of lightweight building materials is useful. Neal Mitchell, in turn, acts as a consultant to a firm in Buenos Aires which makes lightweight aggregate which is what you mix in, instead of gravel, if you want light concrete. People who build tall buildings are among those who would use this material. The trouble with the firm in Argentina is that people out around the countryside don't realize what lightweight concrete can do for them. Here is where Paul comes in. As former Sales Manager for Masslite here in Massachusetts, he has long experience in convincing the doubters and that's what he will be doing in Argentina. Actually, he thinks the assignment will last about a year and he has every intention of returning to Needham.

Joseph C. Pitts authored a recent article in *Industrial Banker Magazine* titled "The INTERNAL Truth-in-Lending." He describes a computer analysis procedure which aids bankers in managing loans. Specifically, one requirement of all "Truth-in-Lending" laws is the disclosure of an annual charge rate which a consumer can use to compare one credit arrangement with another. Joe's analysis procedure suggests a similar type of measurement but from the lender's point of view. Joe has been a consultant to the Federal Reserve Board in the area of computational procedures for the Truth-in-Lending Act. He is president of Carleton Financial Computations, Inc. of South Bend, Indiana.

Secretary of Labor

George P. Shultz is back in the news again. I wrote about him in January, 1967, when he was dean of the graduate school of business at the University of Chicago. Now he is President Nixon's Secretary of Labor. No stranger to Washington, Dr. Shultz was special consultant to the Department of Labor in the Eisenhower years and served under John Kennedy as an advisor to Arthur Goldberg's presidential Labor-Management Advisory Committee.

Charles E. Smith has returned to Robert Heller Associates, a management consulting firm, of Cleveland, Ohio to become Vice President for Operations. After leaving Tech in 1949 with a degree in mechanical engineering, Charles went on to the Yale University Graduate School of Industrial Administration and has been almost wholly in the management field since. He is a past president of the Society for Advancement of Management, a conference leader and speaker at the American Management Association's Manufacturing Seminars and has lectured on production, inventory control and supervisory retraining before various professional societies. He has been a trustee at the Cleveland Institute of Music, a director of the Bridgeport, Conn. Junior Achievement Program, a Director of the American National Red Cross organization and Chairman of a Boy Scouts Sea Explorer program.

Harold G. Ingraham last appeared in this column in March of last year. At that time he had been named actuary at the New England Mutual Life Insurance Company, Boston. Now comes word that he has been named Vice President of individual insurance operations at the same company. In his new position, he will coordinate operations relating to the design of new products, continuing modernization and integration for production of existing products. I find it strange and fascinating to hear life insurance policies described as going through a design phase and then going into production, don't you? Prior to his arrival at New England Mutual, Harold was Chief Actuary at the Indianapolis Life Insurance Company. He lives with his wife, Sandra, and three children, Jeffrey, Elizabeth, and Suzanne, at 29 Valley Road, Dover, Mass.

John Kunstadter, who is Director of R&D for Genesco, Inc., 730 Fifth Avenue, New York City, spoke awhile ago at Windham College in Putney, Vt., on the subject "Science in the Closet." John was one of the most active students on campus and I'm glad to hear he is still getting around.

Political economics

With world finances in various states of emergency, a man with answers is likely to be listened to. Such a man is our classmate, *Francis M. Bator,* currently professor of political economy at Harvard. His article in a recent issue of *Foreign Affairs* titled "The Political Economics of International Money" has commanded wide attention in money management circles. His thesis is that our balance of payments problems have not been brought on by the deliberate efforts of wicked men and that the primary fault lies not in the dancers but in the music, that is, the basic problems which have plagued us arise from the set of rules and practices that have governed international finance since Bretton Woods. Dr. Bator writes entertainingly and well. I commend his thoughts to you.

An all-too-brief note in the *Journal of Paint Technology* for January, 1969, tells us that *Richard G. Alexander* directs technical and manufacturing operations at Arvon Products Co., in the Philadelphia area.

Deceased

I am very sorry to report the passing of

two classmates: *Robert D. Gregg, Jr.,* and *John C. Nygard.* I have no details but have written to the wives of both men in hopes of receiving more information. If it comes, it will appear in this column. The class extends its deepest sympathy to the families of both men.—*Fletcher Eaton,* Secretary, 42 Perry Drive, Needham, Mass. 02192

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Walter E. Kunze of Arlington Heights, Ill., has been elected Vice President for the eastern division field operations of the Portland Cement Association with headquarters at Skokie. . . . *Donald R. Miller* has been elected Vice President of Cresap, McCormack & Paget, Inc. . . . *Alfred J. Gallucci* is in the sand and gravel business in Shelton, Conn., and also owns an asphalt mixing plant on a tract of land which is adjacent to United Aircraft Co., and one mile north of the Merritt Parkway. He and his wife live in Fairfield, Conn., and they have four daughters. They would be very happy to see any old friends who might be in the area. . . . *Albert J. Romano* is now located at Litton Systems—Europe (Data Systems Division), 39 Blvd. De Waterloo, Brussels 1, as Manager, European & Mid-East Marketing Operations.

Stanley Martin, Jr. informs us that, after spending 7 of the last 10 years in Europe, he has returned permanently (?) to Dallas, Texas where he is now Manager, Advanced Requirements for Bell Helicopter Co. He was elected Secretary-Treasurer of the M.I.T. Club of Dallas so he hopes to renew his association with M.I.T. alumni. . . . *Vinson R. Simpson, Jr.,* has been named an Executive Vice President of the Trane Co., in La Crosse, Wisc. Trane Co. makes heating and air conditioning equipment. . . . *Paul Slepian,* Professor of Mathematics at Rensselaer Polytechnic Institute, has been named Professor and Chairman of the Department of Mathematics at Bucknell University in Lewisburg, Pa. . . . *Irvine F. Williamson* has been appointed Plant Manager, Small Vitrified Products of the Norton Company's Grinding Wheel Division in Worcester, Mass.

Frederick T. Rall, Jr., Chief of the F-15 Airframe Division, Aeronautical Systems Division at the Wright-Patterson Air Force Base in Ohio, has been awarded the Exceptional Civilian Service Award, which is the highest award given to a civilian by the Air Force. Mr. Rall was honored for his contribution as Chief of Aeromechanics for the F-111 Aircraft from February, 1965, through April, 1968. He made a significant contribution to the Air Force and the nation by developing a successful solution to a major F-111 technical problem. His solution prevented a significant delay in the performance evaluation of the F-111.

H. L. Barnes, Professor of Geochemistry at The Pennsylvania State University has been named the head of Ore Deposits Research Section as a part of the College of Earth and Mineral Sciences. Barnes has been a member of the Pennsylvania State faculty since 1960. He had previously been a Fellow of the Geophysical Laboratory in Washington, D.C., and had served as Mining Geologist for the Peru Mining Company in New Mexico. He was awarded a Guggenheim Fellowship for 1966-67, spending the year at the Geochemistry Institute of the University of Goettingen, West Germany. He is also the author of numerous publications and the editor of a book, *The Geochemistry of Hydrothermal Ore Deposits,* published in 1967.

Samuel O. Raymond, President of Benthos, Inc., announces the opening of the firm's new plant on Edgerton Drive, North Falmouth, Mass. Benthos, Inc. is the "oceanographic business" which, Mr. Raymond says, will eventually surpass the "space business" in volume. Benthos, Inc., is a developer and manufacturer of oceanographic instruments, founded in 1962 by Mr. Raymond. He is also an accomplished amateur skin diver and jazz clarinetist.—*John T. McKenna, Jr.,* 2 Francis Kelly Rd., Bedford, Mass. 01730

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As we swing into the end of the *Technology Review*'s season (only 1 more issue), I will try to glean all of the remaining news items in an attempt to keep moderately current. If you sent us something and it hasn't appeared, please let us know—we're trying harder.

Mechanical engineering grad becomes youngest Chief of Surgery

After that half-apology I have some very current news: *Gerry Austen,* who was appearing regularly in these columns a couple of years ago because of his outstanding success in the field of cardiovascular surgery (how about that for a graduate mechanical engineer) has just added to his extensive list of firsts by becoming the youngest Chief of Surgery at the Massachusetts General Hospital and Chairman of the Department of Surgery at Harvard Medical School.

Don Brown was elected president of the M.I.T. club of Virginia. He is still with Reynolds Metals as an architect. . . . *Henrik Bull,* also an architect, received the honor of an award in "Progressive Architecture" for a condominium project in Aspen, Colo. . . . *Bob Crockett* is in the economics department of Sun Oil Co., Philadelphia, and his wife, Jean, is in the department of finance at the Wharton School of the University of Pennsylvania. The Crocketts have twin daughters, Lisa and Jenna, 13, and a 10-year-old son, Robby. . . . *Donald Crockett,* on the other hand, is "Trying to implement computer-graphics at LTV-VAD, Grand Prairie, Texas. He and Mary have four children ages 2 through 21 (with ten years between the youngest two). . . . Last year *Karel den Tex* finished his second two year assignment in Augsberg, Germany for I.B.M. and moved from Lexington, Ky., to Rochester, N.Y., "in an effort to move east." They returned to Austria for Christmas but are looking forward to taking a vacation in the eastern U.S. Karel and Ann (Anita), have two children: Adrienne (Adie) 12 and Charles (Chuck) 10. Karel designs I/O equipment at I.B.M. and recently met Lee Rhode who has also joined I.B.M.

Charles W. Ellis, 3rd, is now Director of Engineering at the Vertol Division of Boeing (Morton, Penn?). . . . Our roving bachelor, *Ralph Evans,* is back in New England (Burlington, Mass.) on a temporary R.C.A. assignment. Ralph had previously spent 6 months on loan to N.A.S.A. in Greenbelt, Md. . . . *Aaron Finerman,* S.M., Sc.D. I, is spending his sabbatical at the Jet Propulsion Lab, on a National Academy of Science grant. Aaron is a professor and director of the computing center at the State University of New York at Stonybrook. . . . *James Friend* is Director of the Air Resources Engineering Program at N.Y.U. Jim wrote that, "though I wasn't a course XIX man, I find myself as an Associate Professor in the Department of Meteorology and Oceanography at New York University."

Bill Gable left Maryland and A.A.I. (where he was a vice president) to become director of product operations at Scientific Data Systems in Los Angeles. Hattie and Bill live in Palos Verdes Peninsula and have two sons: Steve 15, and Jim 11. . . . *William Gibson,* N.E. XIII-A, is project director with Tracor, Inc., in Austin, Texas. His function is associated with scientific-engineering-management tasks.

Dick Greenwalt is in Cleveland, Ohio as Manager of Metallurgical Design for Arthur G. McKee Co. . . . *Lawrence* and Jane *Hitchins* live in Sewickley, Pa., and have two children: Owen 9 and Stephanie 12. Lawrence is with the commercial products development department of U.S. Steel. . . . *Robert Hoffman* is at the General Motors proving ground, north of Detroit. He and Betty are among the newer parents of the class with a relatively new arrival: Mark (in addition to 3 year old Karen). . . . *Eugene Koch* designed and opened the largest store in the south devoted to consumer electronics and major appliances. He lives in Virginia Beach, Va., and has four sons ages 9, 11, 13, and 15.

Last month we mentioned *Joseph Iannicelli* but omitted the news relative to his activities. Joe was recently promoted to Technical Director of the clay division of J.M. Huber Corporation in Huber, Ga. Joe will direct overall research and development on clays for applications such as paper coatings, elastomers, plastics and ceramics. During the past six years he has been research manager and assistant technical director of this division. He and Joyce reside in Macon and have three children: Mark 10, Rex 8, and Gina 2. Joe received a Ph.D. from Tech as well as his S.B. in chemistry, spent five years with DuPont and then joined Huber at their Borger Texas Carbon Black Division. Since

leaving Tech, Joe has been issued over fifty foreign and domestic patents. . . . *Lawrence Kuszmaul,* one of our regular informers (seems as though that is not the correct term), has now informed us that he is doing a lot of dam work; completed Holt Lock & Dam at Tuscaloosa, Ala., at the end of 1967 and is now constructing Claiborne Lock & Dam near Monroeville, Ala.

Ready to feel old? *Jonathan Leffler* writes that his oldest child, Jere, will start college in September, 1969 (hopefully M.I.T.). . . . *Myron Lecar* has expanded his work on structure and evolution of galaxies and now has a group in Tel Aviv University working with him (Myron is with the Naval Research Lab). He has a computer made movie which he has shown to art students at Silvermine School in New Canaan, Conn., Galactic Op-Art!. . . Working at Arthur D. Little in Cambridge and living in Acton, Mass., is *Raymond Moore.* Hobbies are boating, skiing and hiking, and I note from his note that the Moores aren't too far behind (or ahead of, depending on how you view it) the Hoffmans: he and Susanne have a daughter about one, plus a 3-year-old daughter. . . . Bumped into *Roy Niemela* at the M.I.T. Faculty Club where he had adjourned after presenting a series of seminars. As we reported previously, Roy is now with the Bureau of the Budget, Executive Office of the President (non-politically) after having taught at the University of Florida for about 10 years. . . . *Anthony R. Nollet,* S.M.,XVI, is president of Management Technology, consultants with offices in D.C., L.A. and Boston (how come we don't have initials for Boston?). . . . *John D. O'Brien* is moving to Guadalajara, Mexico, this summer to help start up a new film manufacturing plant for Eastman Kodak. John and Rosemary are looking forward to a few years in Mexico with their five children.

We are now including the somewhat delayed information that *Donald Parrish* is serving as building commissioner in Evandale, Ohio, Director of the Engineering Society of Cincinnati and a director of the Cincinnati chapter of the Ohio Society of Professional Engineers. (All this in addition to his vocation as Principal Engineer at Aero Tech Consultants.) He and Estela live in Cincinnati and have a 16-year-old daughter, Sandra. Estela is an anesthetist and supervises that facility at Bethesda Hospital. . . . *Ken Porter* transferred to Denver, Colo., from Baltimore—he is with Martin Marietta Corp. Ken and Dolly's daughter Sandra is 10. . . . *Don Reis,* another of our bachelors who checks in regularly, has informed us that he has a new hobby: surfing. . . . *Roy Sachs* is at the University of California at Davis (he should have some interesting tales about campus protests) in the department of environmental horticulture. Five children, ages 2 through 13 keep Roy and Marilyn busy.

Another consultant: *Ed Stefaniak,* is with the firm of Gantaume and McMullen, Boston. Ed and Loretta have four boys (10 to 16) and live in Concord, Mass. *Herb Voelcker* is back professoring at the University of Rochester "after a year in England observing devaluation, economic and political crises, and mini-skirts" in no particular order. (Incidentally, after academically studying the length—or opposite thereof—of skirts in France and England, I personally concluded that they are both shorter and wilder in Harvard Square!) Herb and Jean have two boys, 10 and 4. The older, John, had the advantage of studying Latin and French scripture while in England, and, at home, has a program using a time-shared computer. Progress!

Malcolm Ward is General Manager of Jones and Vining, Inc., designers and manufacturers of shoe making equipment, and their 9 affiliated companies in the U.S. and Canada. He recently completed a sales tour of Europe with no comments on skirt lengths. . . . *John Washburn* writes "got my first trip to Bermuda in the June 1968 race on Dick Lemmerman's ('50) Cal 40 'decibel' with Stu Miller (M.I.T.'s sailing instructor). Wife Barbara flew down to meet us and we stayed a week to celebrate our tenth anniversary." . . . *D. C. Whittinghill* is with the Chicago plant of Campbell Soup Co., as manager of industrial engineering. Son David (12) is halfback on the football team, Dex (14) is in scouts and an 'A' student, and both he and wife Norma are active in church, charities, golf, bridge, etc.

It is gratifying to hear from so many of you, I hope that the trend will continue. Anything that we can do to encourage you to send in news, inform on your classmates, or add to this column is genuinely appreciated and sought after.—*Howard L. Levingston,* Secretary, 358 Emerson Rd., Lexington, Mass. 02173; Assistant Secretaries: *Marshall Alper,* 1130 Coronet Ave., Pasadena, Calif. 91107; *Walter O. Davis,* 346 Forest Ave., Brockton, Mass. 02402; *Paul G. Smith,* 11 Old Farm Rd., North Caldwell, N.J. 07006

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The resignation of *Dana Ferguson* as Secretary of the Class of 1952 is regretfully accepted. Dana will now be based in Sarasota, Fla., and will be travelling extensively. Dana's long service as Class Secretary is very much appreciated. He has served for 12 years and my hope is that I can do as good a job.

Your new secretary is *Arthur S. Turner.* I am Chief Engineer of the Spectrochemical Division of Baird-Atomic, Inc., in Cambridge, Mass. My wife, Sally, and son, Bruce, and I live in Carlisle, a Boston suburb.

The mail this month discloses that *John Meeker* is now consultant with the accounting firm, Haskins & Sells in New York City; that *Richard B. Gillett* is Sales Manager of Filmco, Inc., a subsidiary of R. J. Reynolds Tobacco Company and now lives in Hudson, Ohio and that *Howard S. Bryant, Jr.,* is Manager of the Central Research Laboratory for Mobil Chemical Company in Edison, N.J.

Raymond Wong writes from Kuala Lumpur, Malaysia, that he is doing consulting work in private practice and that he would welcome any travelling members of the Class who might be in the area. Other classmates active abroad are *H. P. Eichenberger,* who is now Director of Research of the European Research Laboratory of I.B.M. in Zurich; and *James W. Hanson,* a director of Esso SAPA with headquarters in Buenos Aires.

Promotions here at home have come to *Charles J. Carter,* now Associate Department Head, Management Systems Department, Mitre Corporation and responsible for the Mitre/Bedford Computing Center; and to *Harold Roth,* now Chief of the Electronic Components Laboratory at the N.A.S.A. Electronic Research Center. *Robert G. Shaver* has been named Vice President for Engineering of General Technologies Corporation of Reston, Va.

Joseph F. Alibrandi, Raytheon Vice President and General Manager of the company's Missile Systems Division, Lexington, has been elected President of the Yankee Chapter of the American Ordnance Association.

Bowdoin College has recently announced the appointment of Professor *Dana Mayo* as Chairman of the Department of Chemistry. Dana was a National Institute of Health postdoctoral Fellow in the chemistry department at M.I.T. before going to Bowdoin in 1962. Appointed an Associate Professor in 1965, he was promoted to full professor last July. He continues to serve as co-director of two special summer programs in infra-red spectroscopy at M.I.T.

Charles H. Ehlers has been named Vice President for Manufacturing of Dewey & Almy Chemical Division of W. R. Grace & Company. *Vincent N. Donnelly* is now Central District Manager for the Blaw-Knox Food & Chemical Equipment Division in Chicago. The Pacific Power & Light Company has announced the promotion of *C. P.* (Ted) *Davenport* to Assistant Vice-President-in-Charge of a newly-formed Corporate Planning and Development Department at the company's headquarters in Portland, Ore.

Other members of the Class reporting their activities are *William Hawe,* Standard Product Manager of the Airco-Temescal in the San Francisco area; *Leonard H. Horwitz,* a member of the Technical Staff of Aerospace Corporation at El Segundo, Calif.; *P. R. Johannessen,* senior scientist at Sylvania Electric Products' Applied Research Laboratory at Waltham, Mass. *Merwin Blum* writes that he and his wife, Janice, a Simmons College graduate, and their three children live in the San Francisco area.

Merwin is Vice President of the S & Q Construction Company, specializing in the engineering and construction of industrial, refinery, power plant, chemical plant and public works projects. A note from Professor *Arthur L. Svenson* says that his book, *Management Experience: The Short Case* has been published by Prentice-Hall.—*Arthur S. Turner,* Secretary, Lowell St., Carlisle, Mass. 01741

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For those avid readers of the *Technology Review* who are members of the Class of 1953, I want to render an apology for the greatly delayed beginning of this column. I can only say that the Class's patience has been given the supreme test, although that was not the purpose or excuse for the delay. In any event, the news for our class has been building up and the following comments have been selected from the considerable data now on hand.

John Becker: Jack has recently been appointed Assistant Superintendent of the Sheet & Tin Division of the new Bethlehem Steel plant at Burns Harbor, Ind. Jack and his wife Sharon have three children, Holly, Jill, and Crais. . . .*Dave Berg* now has his own consulting practice (since 1962). Dave was a great help during our Reunion last June. He and his wife Shirley have two children; Caroline is ten and Nancy is seven. . . . *"Mac" Blair,* who went to Denver upon graduation to begin architectural practice, has now moved back to the Northeast after spending some time in Cincinnati. Mac will be living in Syracuse, New York (5836 Marlow Drive, East Syracuse). *Fred Brecher* is now an associate with the David Bloom Consulting Engineering firm in Philadelphia. Fred is primarily responsible for coordinating and supervising the construction projects which his firm has helped design. Fred and Sandi live at 107 Trent Road, Philadelphia, Pa.; they have two girls—Leslie and Deanne. . . . *Dan Brzezenski* now works for Wolf Research & Development Corporation in West Concord, Mass., where Dan is a project engineer. Dan and his wife Marg have three children.

Arthur Buckley and his wife Lorraine have two boys, Paul and James. They live in Salem, Mass. (22 Savoy Road) and Art works for Arthur D. Little, Inc., in Cambridge. . . . *Ed Colbeth* now works for American Cyanamid in Wayne, N.J., where he is a senior analyst in the Data Processing Department. He and his wife Carol live in Wycoff, New Jersey; they have two boys, Richard and Russell. . . . *Jim Crowley* now lives in Simsbury, Conn. where he works for North American Rockwell Corporation. He and his wife Terese have four children. . . . *James Earl* now is an associate professor at the University of Maryland in the Department of Physics. Jim is doing teaching research work on cosmic rays. He and his wife have three boys, John, James and David. . . . *Wolf (Bill) Haberman* now lives in Framingham, Mass., where he works for Mitre Corporation. Bill's wife Berna aside from being able to care for four children, has been going to college and expects to be graduating this year. . . . *Dick Linde* and his wife Ruth now live in Woodcliff Lake, N.J. (16 Wright St. North). Dick is with Western Union Telegraph Company and he is Director of Business Plan Integration. Ruth and Dick have two boys, Mark and Peter. . . . *Jess Erickson* and his wife JoAnne now live in Toronto, Ontario. Jess is Vice President and General Manager of Kaiser Aluminum & Chemical Canada, Ltd. They have three children with appropriate Scandinavian names: Jon, Karl, and Karin.

Robert McDonald: after leaving Tech, Bob got an M.B.A. from Harvard Business School in 1957. Bob is now one of the senior members of the building-construction firm, Vappi & Company, Inc. Bob and his wife Elaine have three boys, Bobby, Steven and Michael. Since Bob won the reunion golfing championship this past June and also the one in 1963, some thought is being given to award Bob with an extra handicap at our 20th reunion. A special committee will probably be formed to deal with this issue.

Jim Mast and his wife Martha now live in Grosse Pointe, Mich. Jim is a principle with Walter H. Mast Co., custom designers and constructors. He has done quite well in constructing his family enterprise—five children thus far. Jim's address is 300 Cloverly, Grosse Pointe, Mich. . . . *Joe Mullen* now works for Combustion Engineering, Inc., Windsor, Conn. Joe, who is somewhat more precocious than the rest of us, admitted during the reunion to at least three children ranging in age from 24 to 16. Joe was apparently more active as an undergraduate than any of us knew. . . . *Edward F. Leonard* is now a professor of chemical engineering at Columbia University. He is in charge of the Artificial Organs Research Laboratory at Columbia, and is carrying out very interesting work in the medical field. . . . *Richard Simmons* has recently been appointed to the position of Production Vice President-Bar Division of Allegheny Ludlum Steel Corporation. Dick has formerly worked for Republic Steel and Latrobe Steel. Dick and his wife have two children and they live in North Canton, Ohio. . . . *J. Robert Shrieffer,* who majored in physics, participated last fall in a conference at Stanford University which honored Nobel Laureate Felix Bloch. Bob is now at the University of Pennsylvania.

The 15th reunion on Cape Cod last June proved to be another successful one for those who were willing to risk the embarrassment of non-recognition by old cronies, because of receding hairline, exceeding waistline, and the like. As you perhaps know, *Dick Lindstrom* was elected President of our class for the next five years, and *George Hegeman* was elected Vice President. Our class agent is now *Maury Gionfriddo.* Dick, George and myself all work for Arthur D. Little, Inc. in Cambridge; you can reach us through our company address. Maury can be reached through his home address (286 Potter Road, Saxonville, Mass. 01706).

One of the unsettled topics at the reunion was that of deciding in what general area our 20th reunion should be held. Some of the more adventuresome classmates have recommended Bermuda and Hawaii, while others are content to stay on Cape Cod or make a modest shift to southern New Hampshire or Vermont. Inasmuch as our 25th reunion will probably involve remaining on-campus, our 20th represents the last opportunity in some time for the class to consider a way-out place for a reunion. We would appreciate any thoughts you have.

Most of the above comments relate to our classmates' work day activities or the results of late nocturnal interests. When you write next, please let me know of your more legitimate extracurricular activities. In closing, I want to express in behalf of the Class, our thanks for the work of *Dick Chambers* in organizing a successful reunion. It is also appropriate to pass along the keynote of *Paul Shepard*'s effective and memorable talk during the Reunion Banquet: that during our present highly productive years let each of us spread our interests and energies into some non-professional areas so as to provide social as well as business benefits.—*M. C. Manderson,* Secretary, Arthur D. Little, Inc., Cambridge, Mass. 02140

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15th REUNION, June 13-15, Jug End, South Egremont, Mass.

Very Little news this month. *Charles Masison* reports a very enjoyable evening spent in Pasadena with *Sam* and Lilly *Losh.* Sam lives in a very wild setting on a small mountain in the Los Angeles suburbs. His cantilevered deck overlooks a forested valley with the wild birds, deer, etc. Lilly, a terrific hostess, regularly entertains foreign students, providing dinner and sightseeing for these visitors to our shores. Sam travels 35 miles to Electrooptical Systems where he is a project manager. The Losh's have two children, Steven and Betsy. Charlie, a New Englander waiting for the first signs of spring, was impressed with the bouquet of camellias picked on the spot from Sam's tree.

Charlie reports a new responsibility. He now heads up an integrated systems operation at Raytheon's Submarine Signal Division. This is a complete business area which includes a Combat Systems Laboratory, four program offices and a marketing group. Their military products include sono buoys, submarine combat systems, surface ship combat systems and avionics, and they are diversifying into non-military areas of traffic and transportation studies.—*E. David Howes,*

Jr., Secretary, Box 66, Carlisle, Mass. 01741

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Austin Somes, an electronic engineer at the Ames Research Center of N.A.S.A. at Moffett Field, Calif., writes of his marriage in February, 1968, to Susan Larned of East Palo Alto, and of the arrival in January of their firstborn, Daniel Peter.

Tony Diglio, who now has three sons, writes from the Netherlands, where he has been working for over a year now in Europort, west of Rotterdam. He is Technical Manager for Koram, a joint venture of Celanese and a Dutch organization, K.Z.O., manufacturers of petrochemicals. . . . *John Sullivan* has moved to the Philadelphia area as Chief Metallurgist of Alan Wood Steel Company. . . . *Bert Schafer* went to work last July at the Smithsonian Astrophysical Observatory in Cambridge after 12 years at the Lincoln Labs. Having become involved in civil rights work in 1962 and having worked since helping minority groups "to get more of the social pie," Bert decided to get "out of the mainstream of missiles" into less war-oriented projects in computer software.

The Department of Biochemistry at the University of Connecticut Health Center has announced the appointment of *Marvin Tanzer* as an assistant professor who will work with students in the medical and dental schools of the Center. Marvin, who received an M.D. from New York University, was a research associate at the Harvard Medical School and an assistant biologist at Massachusetts General at the time of his appointment. . . . A paper by *Charlie Prewitt* in *Science* reminds us that he will become an associate professor at the State University of New York at Stony Brook, Long Island, next fall in the Department of Earth and Space Sciences. Secretaries: *Mrs. J. H. Venarde* (Dell Lanier), 16 South Trail, Wilmington, Del. 19803; *L. Dennis Shapiro,* Aerospace Research, Inc., 130 Lincoln St., Boston, Mass. 02135

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It's that time to remind you that the 15th reunion is only two years away. Start making plans because the committee is gearing up for a really great "shew!"

Robert Block is in the metallurgical department at the University of Oklahoma. . . . *Bing Cady* is now Acting Director of the J. Carlton Ward Laboratory for Nuclear Engineering at Cornell and plans to work in Bethesda, Md., for the A.E.C. during a sabbatical leave this coming year. . . . *Chas Hoult* gave a paper on "The Process of Selection of a Transportation Subsystem for Upper Atmosphere Experiments" at the Seventh Annual Aerospace and Science meeting last January. . . . Did we tell you that *Mat Lorber* and Ray Stata, '57, cofounders of Analog Devices in Cambridge, brought their company to public ownership this spring?

Robert Meeker was elected Vice President of International operations of Hobart Manufacturing. . . . *John Pierce* was the author of a lengthy article in *Management Science* last November titled "Applications of Combinatorial Programming to a Class of All-Zero-One Integer Programming Problems." John continues his teaching and research back at the old ranch in Cambridge. . . . *Dick Skavdahl* coauthored a paper titled "The Irradiation Behavior of UO_2 PuO_2 Fuels in PRTR" way back in 1966 and it finally showed up in print in the Metallurgical Society Conferences review on High Temperature Nuclear Fuels. Sorry about the abbreviated article but an April deadline conflicts with taxes and all that.—Co-Secretaries: *Bruce B. Bredehoft,* 16 Millbrook Rd., Westwood, Mass. 02090; *T. Guy Spencer, Jr.,* 73 Church St., Weston, Mass. 02193

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There are a number of tidbits this month. First *Bob Brown* is now Senior Lecturer in the Department of Chemical Engineering at Monash University, Victoria, Australia. From September 1968 until August 1969, he was Visiting Associate Professor in the mechanical engineering department of Carnegie-Mellon University, Pittsburgh. . . . *Harry Duane* has been appointed group vice president of international operations, for Norton Company. *Howard Resnikoff* is an Associate Professor of Mathematics at Rice University in Houston. He has been doing work in the field of speech recognition and recently coauthored an article in the Rice University *Review* covering the development of a new concept for hearing aids. A photograph came along the other day (reproduced here) of *Bill Walsh* who has recently been appointed Assistant to the President of Mobil Oil Corporation. I mentioned this a few months ago.

Charles Speer dropped us the following note. "I have just formed the firm of Charles Speer & Co., Management Consultants, Piazza Duomo 22, Milan, Italy. We offer the most advanced techniques in marketing, production and computer services for Italian subsidiaries of American companies (General Electric) and larger Italian companies (Olivetti Group). I have had over ten years experience in Italy and am in a position to advise any M.I.T. Alumni with Italian interests (end of commercial)." . . . *Bob Laurence* has been named Associate Professor of Chemical Engineering at the University of Massachusetts. Bob had been an Assistant Professor for three years at Johns Hopkins University. He received his master's degree from University of Rhode Island and his Ph.D. from Northwestern University.

Ray Stata co-founder, major stockholder, and formerly vice president, marketing, becomes vice president engineering and marketing of Analog Devices, Inc. . . . *Morton Rosenstein* has joined Avco Computer Services as Marketing Research Manager. He will be responsible for marketing research leading to further penetration of commercial markets for Avco's data processing services. He was formerly Marketing Research Manager at Norton Company's Vacuum and Metals Division, and prior to that was employed by Ionics, Inc., in Watertown, Mass. Morton and his wife, the former Barbara Sparks of Brookline, have three children. That's all for this month. As Bob and Ray would say, "Write if you get work."—*F. L. Morefield,* Secretary, 18 Whaddon House, William Mews, London, S.W.1 England.

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I must apologize for the relative paucity of Notes this month, dear friends, but I neglected to do any legwork, expecting to receive the usual windfall of clippings, etc. from the Review office. Unfortunately, a manpower shortage there has left me high and dry.

Dwight Crane writes to tell us that he'll be returning to the Boston area next month as a lecturer and member of the Faculty of the Harvard Business School, after resigning his position as Director of Operations Research for the Mellon National Bank and Trust Co. He and Loretto have two children: Catherine, 2 and Elizabeth, born last August. . . . *Leander Pease* has been appointed senior engineer, technical and economic evaluation, by Kennecott Copper's Ledgemont Lab in Lexington, Mass.

Coming up with his first book, *Give the City a Chance,* is *David Jokinen;* the work was published in Dutch as part of his consulting job in Europe for the Dutch National Highway Foundation. He's presently in his second year at Eastern Michigan University as a Visiting Lecturer in City Planning. Dave has a year-old daughter, Carrie Lee, and a "booming" real estate business throughout Michigan.

Say, you know it's funny how you run into people. I'd heard rumors for several months now that my '59 fraternity brother, *Carl Neu,* was working in the Boston area after a long hitch in the Army. We finally ran into each other one night at the Hertz counter at the Los Angeles airport—seems we'd taken the same flight from Boston without noticing each other. Carl is married now, and is working in the M.I.T. Industrial Liaison Office. We're coming to the end of the line now for the Zeider's class notes. My successor will probably have been elected by the time you read these few lines. His job will be much easier if you keep the news coming; besides, I'd like to be able to sit back and read about the rest of you. Don't be afraid to send photos, either, as they liven up the column considerably. —*Glenn Zeiders,* Secretary, Avco-Everett Research Laboratory, 2385 Revere Beach Parkway, Everett, Mass. 02149

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You'd think that I'd learn—but I don't. After my less than generous remarks about *Gerry Hurst*'s fascinating paper in the last column, the fates have seen fit to punish me by sending along two more: "Advances in Vacuum Deposition of Metals and Dielectrics" by *Vance Hoffman* and a Mr. Herte, and "Optimization of Natural-Gas Pipeline Systems Via Dynamic Programming" by *Bob Larson* and a Mr. Wong. Great stuff, great stuff.

Bob Larson is with the Information and Control Laboratory at the Stanford Research Institute. Vance's life history is included with the article, so here it is: He worked for the Electric Components Division of Corning Glass Works right after graduation, then was an ordnance instructor in the U.S. Army Ordnance School at the Aberdeen Proving Ground. He joined Varian Associates Vacuum Division in 1962 and has held a variety of positions there. In 1967, he was appointed Product Manager of new coating application and products at Varian. And at some time during all of this, he found time to co-author the article which appeared in the November 1968 issue of *Plating.* (Bob Larson's article was in the October 1968 issue of the *IEEE Transactions on Automatic Control.)*

Malcolm Fraser was married to Janet Randall on March 29, in Pittsburgh; the Frasers will be living in Pittsburgh. *Robert Crossley,* a Captain in the Air Force, has been reassigned to the Air Force Institute of Technology at Wright-Patterson AFB. He has just been graduated with honors from the Air University's Squadron Officer School at Maxwell AFB, Ala. *George Walsh* has been named manager of ocean systems engineering for the Raytheon Company's Submarine Signal Division in Portsmouth, Rhode Island. George was formerly a senior engineer in advanced research and development.

Joseph O'Connell writes: "After three years working for Kaiser R&D in the San Francisco area, I have moved my wife and two daughters to Baton Rouge, La., to log in some plant experience. Marvelous stuff. I am the technical superintendent for the Chemical Works at Grammercy. *Bob Gurnitz,* who is at Rocketdyne, came down for some Mardi Gras experience." . . . *Louis Wajda* is teaching at the College of Southern Idaho. . . . *Larry* and Rhea *Israel* and their two daughters live in Allentown, Pa., where he works for Air Products and Chemicals, Inc. . . . *Lawrence Carr* received his Ph.D. in Aeronautics from New York University last June and is now working at the U.S. Army Aeronautical Research Laboratory at the Ames Research Center in California. He and his wife Janice live in Palo Alto. . . . *Bob Slusser* has "moved to Des Plaines, just outside Chicago, to take a position as Manager of Finance and Administration for Warnecke Electron Tubes, Inc., an affiliate of the Northrop Corporation. I subsequently married the former Linda Killeas, who is currently a Ph.D. candidate at Northwestern University in Chicago."

And news from the Spragues: Chris just returned from a five-day business trip to Paris. He had a wonderful time; I sat home and sulked. In September I'll join the faculty at the University of New Hampshire's Whittemore School. I'll be teaching Production and Operations Management to M.B.A. candidates and seniors in the B.B.A. program. Sounds like fun. Send copies of your summer travel itineraries to—*Linda G. Sprague,* 10 Acorn St., Cambridge, Mass. 02139

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The following short notes come from classmates bringing us up to date on their activities. *Roger M. Rowe* is attending the Harvard Business School and expects to receive an M.B.A. in June, 1969. . . . *Gerald L. Parker* is still with Siliconix Inc., in Sunnyvale, Calif., and has recently been promoted to Department Manager of the Integrated Circuits Department—enjoys his work. . . . Dr. *Robert M. Nassau* is finishing his first year of residency in Pediatrics and will join the Air Force in July with the expectation of being stationed at Hanscom Field, Bedford, Mass. He looks forward to renewing old friendships. . . . Vital statistics on *Herbert L. Selesnick* include the following: he received a Master of Science degree from the Sloan School of Management in June, 1964, married Judith Ann Finkelstein on October 31, 1965, has a daughter, Mary Lynn, born October, 1968 and is now attending M.I.T.'s political science department in hopes of receiving his Ph.D. in political science in June, 1969. After graduation, Herbert expects to resume a career in public administration consulting.

Robert A. Wagner's background includes marriage to Marie M. Plemmons in June, 1968, completion of requirements for a Ph.D. from Carnegie-Mellon University, September, 1968 in computer science, and he is presently Assistant Professor of computer science at Cornell University. . . . *William H. Anderson* is a resident physician in psychiatry at Massachusetts General Hospital. . . . Also in the medical field, *Richard N. Sutton* is presently serving as a surgeon for the Army Medical Corps at Erwin Army Hospital, Ft. Riley, Kansas. . . . *Thomas G. Burns* reports that he has taken a new position as assistant to the Managing Director of Caltex Deutschland and also that he had a son, Erik, born on Valentines Day, 1968. . . . The very active *Frank C. Sprow* has been promoted to Section Head in Esso Research and Engineering Company's Synthetic Fuels research labs, Baytown, Texas, where he is working with the conversion of coal to liquid fuels including gasoline. . . . *John D. Cervenka* writes that he is a junior in the University of Minnesota Medical School. He will receive his M.D. in June, '70. Lawrence Sher is now an aerospace engineer at Nassau Electronic Research Center in Cambridge, Mass. He is engaged in research and development of sensors for strap-down navigation and control systems and also in designing and measuring vehicle vibration induced sensor errors.

We hear again from *David S. Stare* in Germany, who has been living there since spring of 1967 and working for the Rasselstein A.P. in their market development activities. Rasselstein is the largest European manufacturer of steel packaging materials according to Stare. He will return to the U.S. sometime late in 1969 or early 1970. . . . *Peter E. Thurston* lets us know that after completion of a two-year U.S. Army tour he is now working as a marketing representative with I.B.M. Data Processing Division selling computers to Lockheed in Sunnyvale, Calif. His Army tour included one year assigned to Nassau in Huntsville, Ala., on the Saturn V program and 10 months in Qui Nhon, Vietnam, as officer in charge of the Depot Computer Center. . . . *Steven J. Brams* is Assistant Professor of Political Science at Syracuse University, and presented a paper in June, 1968 at the Conference of Mathematical Theory of Committees and Elections in Vienna. He was recipient of a social science research council faculty research grant during the summer of 1968 and has received a National Science Foundation grant for 1968-69 research.

Neil Doppelt is still with the New York office of Arthur Anderson & Co., as senior systems analyst, where his assignments involve consulting in the area of marketing information systems and operations research. . . . *Thomas H. Gawronski* received his Ph.D. in molecular biology from Dartmouth College in June, 1968 and is presently doing N.I.H. postgraduate work at the University of Minnesota. His wife, Jane, is completing her Ph.D. in math education. . . . A short note from *Bojey Salmon* tells us that Bill Bloebaum has moved to Louisville, Ky., where he has been promoted to marketing manager for Ryan Industries, a Cosmodyne subsidiary. Our thanks to Bojey for the note. Please keep the cards coming on your personal information and background.

1968 Alfred Nobel Prize

We have received a very late clipping from the Civil Engineering, United Engineering Center magazine which announces that the recipient of the annual Alfred Noble Prize for 1968 is *Richard Holland,* an electrical engineer and member of the I.E.E.E., for his paper, "The Equivalent Circuit of A Symmetric N-Electrode Piezoelectric Disk," published in the January 1967 issue of the *IEEE Transactions on Sonics and Ultrasonics.* Holland holds the B.S., M.S., and Ph.D. degrees in electrical engineering from M.I.T. and has been employed since 1964 in the Sandia Laboratory at Albuquerque, N.M., where his primary interest is in piezoelectric phenomena. He has published about 20 papers, mostly on tech-

niques for designing piezoelectric devices and is author of a text in the field to be published by the M.I.T. Press later this year. The Alfred Noble Prize, a joint award of the four original Founder Societies and the Western Society of Engineers, was established in 1929 in honor of the late Alfred Noble, president of A.S.C.E. and the Western Society of Engineers.

In the publication news, we have an article coauthored by Mr. *T. R. Strollo,* of Bolt Beranek & Newman, Inc., Cambridge, Mass., for the Air Force, "The BBN Hybrid Processor," June, 1968. This article describes hardware and software for the Hybrid Processor constructed for the SDS-940 computer and revisions planned for the Hybrid Processor which will be designed for the PDP-10. . . . The Associated Industries of Massachusetts' new directors include *John R. McAllister,* who was named vice president and general manager, Aerospace Systems Division Defense Electronic Products of the Radio Corporation of America in 1967. He is a member of the Electronic Industries Association, the Aerospace Industries Association, National Space Club, American Ordinance Association, and the A.I.A.A. . . . *Edward A. Feustel* has been appointed Assistant Professor in computer science at Rice University.—*Gerald L. Katell,* Secretary, 310 Hoge Building, Seattle, Wash. 98104

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Spring has arrived and I have stored the skis after the best year of skiing on record in New England. This means that I will probably be in town more in the months ahead and would enjoying hearing directly from *any* classmate who is in the area. Please give me a call and stop by for some refreshments. Your stopping by will help me with a problem that I am sure you have noticed namely the use of your full proper name in the column. I am able to supply nicknames for those I know, but have not done this in most cases so far in order to be fair to all. So either stop by and get acquainted or at the end of your notes sign your name as your friends know you. The latter is particulary important in the case of notes included with contributions as the top of the envelope is removed by the Alumni Office and only the bottom is forwarded. They then write in your formal name so any nickname information included at the top will, in most cases, be lost.

I would like to express a word of thanks to *Pete Van Aken* for his appeal for news. The response has been very light and I will soon have depleted that on hand. So with this said more of the news in brief form. . . . *Philip Graham* reports that he is at Rensselaer working on a Ph.D. in aeronautics after leaving the Naval Air Propulsion Test Center in New Jersey. He received an M.S. from R.P.I. in 1965. . . . *Laurence Gardner* is interning at Massachusetts General Hospital after graduating from Harvard Medical in 1967. He is living in Cambridge with his wife Behna and a daughter. . . . *Edward Goldblum* earned his M.S. at the Sloan School and is a management consultant with Peat, Marwick, Livingston & Co., in Boston. . . . *Richard Hull* is with Hull Associates in Stanford, Calif. They do software for non-business computer systems. . . . *Avery Hevesh* is with Avco in Wilmington and lives in Framingham, Mass., with a wife and two children. . . . *Richard P. Hervey* completed three years at Western Electric and is now chief engineer of the Winters Foundry & Machine Co. . . . *Edward Gershuny* reports he has a wife Frieda and a daughter Beth and is working for the I.B.M. Patent Department at Poughkeepsie after graduating from the American University Law School.

Harley Jordan extends an invitation for anyone in the area to visit him at his home in South Daytona, Fla. He reports a wife and three daughters. . . . *Robert Kane* received his Sc.D. from Tech in metallurgy and is now with the International Nickel Co., N.Y. He now has a baby boy. . . . *Edward Kanegsberg* writes that he and his wife Barbara, a Bryn Mawr graduate, are both working on Ph.D.'s at Rutgers. He in physics and she in plant biochemistry. . . . *Harry Kaplowitz* is the proud father of a son David, his first. Harry is founder and director of Infodata Systems Inc., of Rochester, N.Y.

Steve Kaufman was promoted to Group Controller—Special Metals Division of Chase Brass and Copper, Inc. . . . *David Kelly* completed his M.B.A. and is employed as an economist at the University of Rochester's Center for Naval Analysis in Arlington, Va. . . . *Roy Komack* is working for United-Carr in Watertown, Mass. Both he and his wife Constance are studying for their masters at Boston University. Roy is completing an M.B.A., Constance is in biochemistry.

Harry Koons is with the Aerospace Corp., in El Segundo, Calif., after completing his Ph.D. in geology and geophysics at Tech. He is married to the former Ann Sparks a graduate of the Fine Arts School at Boston University. . . . *Robert Kurtz* graduated from the Albert Einstein College of Medicine and is interning at Johns Hopkins Hospital. He is married to the former Mimi Collins of Louisville, Ky.

James Kuzdrall and his wife Emery are living in North Salem, N.H. He is working for Sanders Associates in Nashua. . . . *Lawrence Kazanowski* reports he is still single and would enjoy having a few beers with classmates in the Detroit area where he is with Ford's Product Planning Office. . . . *John Lamberti* is a surgical resident at Peter Bent Brigham Hospital in Boston. . . . *Mark Lawner* reports that he was married in Haifa, Israel, in 1965 to the former Esther Klausner and they have a daughter Keren. He is with General Planning and Resource Consultants, St. Louis, Mo. . . . *Meyer Lifschitz* has completed his internship at the University of Pennsylvania Hospital and is now at the National Institute of Health, Bethesda.

Bay Area report

Our Assistant Secretary for the Bay Area *Michael Bertin* reports the birth of a new child Laura Joyce. He also had news of several '63ers in the Bay area. *Gene Sprouse* is in the same group with Michael at Stanford. Gene also has his Ph.D. and is married and the father of two children. . . . *Steve Levy* is living Menlo Park and working for Stanford Research Institute. Steve is also managing his own investment counseling firm. . . . *Frank Levy* is a professor in the economics department at Berkeley. . . . *Richard Males* completed his Ph.D. at Tech and is now a civil engineering consultant with an Oakland firm. Also from Michael: "I will report at the next opportunity the first three classmates who write what is wrong with page 292 of the 1963 *Technique.*" My thanks to Michael for this report.—*Martin Schrage,* Secretary, 305 Massachusetts Ave., Arlington, Mass. 02174

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The Class Hero of the Month is *Edward Casper,* who writes that he has just received his Ph.D. from Columbia, and has started work as a postdoctoral Research Associate at Yeshiva University for Professor Irving Borowitz. His wife Gale is assistant librarian in Butler Library at Columbia. . . . *John Bartelt* was awarded his Ph.D. in chemistry from Michigan State this past December. . . . *Charles Counselman* co-authored an article in the October issue of *Science* titled "Scientific Uses of Pulsars." . . . *Ernie Glickman* has been working since August 1967 as a management consultant for Harbridge House, Inc., in Boston. He is a member of the general management along with *John Windle,* who also graduated from the Sloan School in '64. . . . *Robert Gray* is a lecturer at the University of Southern California and expects to receive his Ph.D. there in August. He spends his spare time playing the guitar, sailing, motorcycling, and weight lifting. . . . *John Graham* is completing a rotating internship at St. Mary's Hospital in San Francisco, and is planning to take psychiatric residency training at Jefferson Medical College in Philadelphia beginning in July of this year.

George Hegeman gave his views on the need for computerized management information systems in the September issue of *C and E News.* . . . *Clifford Moller* was featured in a past issue of *New England Business* in his role as president of Precision Chemical Pump Corp. . . . *Bill Roberts* reports that he recently completed his Ph.D. in math at M.I.T., and that he is now an assistant professor in the math department at the University of Virginia. He and his wife Linda are looking forward to the milder weather.

Robert Rothman received his Ph.D. from Northwestern in materials science, and is now employed at Battelle Memorial Institute in Columbus, Ohio. He has a daughter, Rachel. . . . *Kenneth Schatten* had an article in the December issue of *Nature* concerning a prediction of the

coronal structure for last September's solar eclipse. . . . *Michael Stulbarg* will receive his M.D. at Harvard this June, and is hoping for an internship in California. He plans to specialize in internal medicine. . . . *Donald Topkis* published an article in the November issue of *Management Science* dealing with inventory theory. He holds a Ph.D. in operations research from Stanford, and is now an Assistant Professor of Industrial Engineering at Berkeley. . . . I hope to see many of you at our upcoming **First Reunion!**—*Ron Gilman,* 1021 Oakmont Pl., Apt. 8, Memphis, Tenn. 38107

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Since I received very little mail during the past few weeks this month's column will be shorter than usual. I know that the summer weather will reduce your will to write, but how about writing just a short note? I also am requesting any interesting photos that you may have; if I don't receive any, I will probably stoop so low as to use a photo of myself (for example, a shot of me on a camel!). Consider yourself forewarned. Sexy and gory phots will be especially appreciated.

Second in national crew championship
Alan Hausrath writes that he and *Dennis Kalla* both rowed in the Union Boat Club eight that finished second in Intermediate eights race in the national championships in August, 1967. Alan is a second year graduate student in the Division of Applied Mathematics at Brown. He writes that he has a NDEA Fellowship and that he is plodding slowly towards a Ph.D. Ahead are prelims, orals, and a thesis.

In 1968 *Christopher Scholz* spent an active year with the Sismos Lab of California Institute of Technology. He is now with Lament Geological Observatory in New York. . . . *Sydney Martin* is Program Manager-Systems Analysis with Analytics, Inc., a relatively new and small consulting company. . . . *John Riordan* is a mechanical engineer at Hamilton Standard, Windsor Locks, Conn. He received his M.A. in physics from Berkeley last September. . . . *Mark Kapolowicz* married the former Sandra Muir in June of 1968 and is now working in research and development at Nordens, a division of United Aircraft.

I am happy to report that *Robert Hodges* is alive and living in Swarthmore, Pa. . . . *Janet Allen* is a graduate student in biophysics at Berkeley. . . . *Ed Kirsch* is completing his second year at the University of California, San Francisco Medical School. . . . *Franklin Mills* is in his second year at the University of Chicago.

Paul Hayward is attending Harvard Graduate School of Education in the Masters of Arts in Teaching Program. Presently he is completing a one-year internship by teaching general science at Bigelow Junior High in Newton, Mass. He married the former Bonnie Sherburne on December 22, 1966; they have one child, Heidi Marie, born August 28, 1968. They also have had four foster children with them at various times during the past year. . . . *David Saunders* is studying developmental biology at John Hopkins. He recently became engaged to Miss Judy L. Anderson, University of Michigan, '68.

In the Greek Army
Since graduation *N. Theodossiades* has been serving as a sublieutenant in the Greek Army. He also became engaged to Miss Katerina Katsachina of Athens. Although he is having a great time in Athens he plans to go to business school in either New York or Cambridge. . . . *Ed Snyder* is in U.S. Navy Officer Candidate School in Newport, R.I. He writes that it "Beats the hell out of the draft.". . . *Don Partridge* is enjoying Walter Reed style army life; he's doing research in neurophysiology. He has a new arrival, a daughter, Erika, born September, 1968.

Robert De Bonte, having received a deferment for poor eyesight, is continuing his studies at Purdue. He recently received his M.S. in physics and became engaged to Miss Pamela Laswell. The wedding is set for August. . . . And finally, I report that *Richard Rush* is in the Peace Corps on the Ivory Coast. . . . Tell me how it is.—*Jim Swanson,* Services Provinciaux, Beni-Mellal, Morocco.

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After a two month vacation, the feminine viewpoint returns this month to the Class of '68 news. We just discovered, incidentally, that I'm not the only wife who gets drafted into helping to produce *Technology Review* copy. Mike and I solved the March Double-Crostic, and with our prize (a photograph by Crawford H. Greenewalt, '22) came a letter from puzzle editor David Holt, in which he explained that his wife, Judith, helps him make up the crostics. So the feminine touch is very much in evidence in the *Review.*

I surely thought Mike's graduation would remove him forever from the sphere of student politics. Not so. He attended and Eastgate Community Association meeting last month out of idle curiosity, and somehow came back the Vice Chairman. Once a student politician. . . .

This month marks the first anniversary since our graduation. Starting next month, we will be displaced from our prize position at the end of the Class Review. I hope you all stay with us as we move up in the world!

100th heart donor
We are sorry to report the death of *Marc Seelenfreund.* He was killed in an accident in Parma, Ohio, on his return from Northwestern University for Christmas vacation. I am sure we all join in expressing sympathy to Marc's family. Marc was the world's 100th heart donor. Mr. Wylie Julliard of Babylon, N.Y., a 22 year old aeronautical student, was the recipient.

Rich Lufkin wins the Class Hero of the Month award for dropping in to see us recently on a visit to Cambridge. Rich is now at the Wharton School, University of Pennsylvania, working for an M.B.A., and is in Navy R.O.T.C. He expects to spend 10 weeks on a submarine cruise this summer. He mentioned that *Stan Chang* is also at the University of Pennsylvania, in Biomedical Engineering, and that *Roger O'Dell* was elected Vice President of the Graduate Student Association there.

William Ohm has been working as an engineer with Computer Technology, Inc., in Dallas. He writes that he has just returned from a N.A.S.A. contract at the Langley Research Center, Hampton, Va., where he was working on the software for a simulator for "jet shoes," a foot-controlled maneuvering unit for astronauts. The simulator is run by three analog computers with a digital for checkout.

James Cormier is a systems engineer for I.B.M. in Portland, Maine. He mentioned that he meets many M.I.T. alumni within I.B.M. and at customer installations. He hopes to return here to continue graduate work. In the meantime, skiing and hockey take up most of his spare time, along with his wife Laurice and his two-year-old son Jamie.

A call for people in the Binghamton area from *Andrew Friedland.* Andrew is teaching at Johnson City High School, Johnson City, N.Y.—five math courses and one political science class—and writes that he would like to hear from class members in the area. His phone is 772-1354.

Our only engagement announcement this month comes from *Robert MacDonald.* Robert was engaged in February and plans to be married in August this year. He works as a systems engineer at Honeywell Electronic Data Processing (EDP) Technology Center.

Pat Pollock is working on interplanetary flights for I Labs, and Private *Julian Freret* is in the U.S. Army, stationed at Redstone Arsenal in Alabama.

Dan Belin is in his first year at Harvard Medical, and *Phillip Weidner* is a first year student at Harvard Law. *James Lewis* is enrolled in a Ph.D. program in biochemistry at Berkeley. *Lissy Quinlan* is at the Institute of Marine Science at University of Alaska. At the other climate extreme, we've noticed that *Matt Salisbury* is in Kula, Hawaii, although we're not really sure what he's doing.

We'll be leaving our favorite Institute again for the summer and returning to New Jersey to work. Mike will be back with Bell Labs in Holmdel, and I'll be at Ft. Monmouth again. Mail for us should be sent to the address below until September.—*Gail* and *Mike Marcus,* 510 Fifth Ave., Asbury Park, N.J.

Course Review

Copy for this issue of *Technology Review* was due from your Secretary about March 15. Information reaching him after that date will be reported in the July/August issue.

V

Walter J. Bernard, B.S.; M.S., University of New Hampshire 1950, 1951, Ph.D. in organic chemistry M.I.T., September 1954, has been promoted to Director of Research and Development of the Sprague Electric Company, North Adams, Mass. Walter served as a sergeant in the U.S. Army Infantry from April 1943 to April 1946 and attended the Plymouth Teachers College, Plymouth, N.H., for one year, 1946-47, in preparation for college. Semiconductors, integrated circuits, capacitors and electronic filters, etc., seem to be rather remote from chemistry as it was in 1954 but chemistry, like physics and mathematics, is a basic science. It does not belong in this column, but it is interesting to note that Robert C. Sprague, S.M., XIII-A (a naval constructor) is Chief Executive Officer of the company.

Barry M. Bloom entered M.I.T. as a first-year student from Sanford, Maine, High School in 1945, was awarded the S.B. degree in chemistry in 1948 and the Ph.D. degree in organic chemistry in 1951. He was awarded a National Research Council Postdoctoral Fellowship for study at the University of Wisconsin. In 1952 Barry joined the Research Division of Charles Pfizer and Co., Inc. In 1967 while the Director of Medicinal Chemicals Research for Pfizer he attended the program for senior executives at the Sloan School of Management, M.I.T.

A news release from Pfizer (1/16/69): "Dr. Barry Bloom, Director of Medicinal Products Research and Development has been named a vice president of Pfizer Pharmaceutical, responsible for the Pfizer Medicinal Products Research and Development Laboratories at Groton, Conn., Brooklyn, N.Y., Maywood, N.J. and the Pfizer Agricultural Research Center at Terre Haute, Ind. Dr. Bloom will report to *Gerald D. Laubach,* Ph.D. V 1950, who became vice president for Medicinal Products Research and Development in 1964, a director in 1966, and a member of the executive committee of the Board of Directors recently. Mr. George B. Stone, S.M., Sloan School of Management, 1958, was also elected to the executive committee of the Board of Directors. He has been with Pfizer since 1940 and is the Manager of the Pfizer Laboratory Division.

Ronald A. Brightson, B.S., physics—University of Michigan 1947, was awarded the S.M. degree in chemistry at M.I.T. in 1950. Through his association with Professor Charles Coryell and Professor John W. Irvine, Jr., he became especially interested in nuclear energy, and he founded and for 12 years has been the president of Nuclear Science and Engineering, located in Pittsburgh, Pa. Mr. Brighton and his associates have now formed a rather unique company—Advanced Technology Consultants Corporation (ADTEC)—to recommend qualified technical specialists as consultants to industrial, financial and government organizations in the fields of nuclear energy, oceanography, computer science, pollution control, medical electronics and aerospace technology.

Rudolph A. Carboni, A.B. 1947, A.M. 1948, Columbia University, Ph.D. V, September 1953, has been appointed laboratory manager at the Jackson Laboratories of the DuPont Co., Wilmington, Del. Rudy has been with DuPont since he completed the requirements for the doctorate. He has been research supervisor in the Dyes Division and division head of the Intermediate-Exploratory Division (1967). He was the recipient of the U.S. Rubber Fellowship 1952-1953, and was employed by Charles Pfizer and Co., Brooklyn, N.Y., from August 1948 to September 1950.

John Alan Carlson, B.S. February 1961, University of California at Berkeley; Ph.D. in organic chemistry 1968, has been named an Associate Research Chemist at the Sterling-Winthrop Research Institute, Rensselaer, N.Y. Dr. Carlson was a chemist with Merck and Company from February 9161 to September 1964. His research at M.I.T. was directed by Professor George Büchi. He served as a teaching assistant and held a Solar Energy Predoctoral Fellowship in 1965-1966 and an N.I.H. Fellowship in 1966-67 and 1967-1968.

Robert J. Cotter, a senior Group Leader in the Research and Development Department of the Union Carbide Chemicals and Plastics Operations Division, Bound Brook, N.J. is credited with the development of a new family of plastics which possess molecular interactions leading to previously unstudied color and electrical properties. Dr. Cotter was a student of the late Dr. Arthur C. Cope and was awarded his doctorate in organic chemistry in September 1954, three years after entering M.I.T. He was awarded the Sc.B. degree from Brown University in 1951. While at M.I.T. he was a teaching assistant for 2 years and was awarded the American Cynamid Predoctoral Fellowship for 1953-1954.

Gerald D. Laubach, Ph.D. 1950, a Corporate Vice President of Charles Pfizer and Company, has been named President of a new Pfizer unit, Pfizer Pharmaceuticals. The unit will encompass the production, research and marketing of all drugs in the United States. Dr. Laubach has been with Pfizer since he was awarded the doctorate in organic chemistry. Course notes in the July-August issue of the *Review* of 1968 mention his election to the Board of Directors.

James N. Little, B.S., University of Kansas, June 1962; Ph.D. Analytical Chemistry, M.I.T., 1966, has been promoted to Manager, Chromatography Research at Waters Associates, Inc., Framingham, Mass. Dr. Little completed the requirements for the doctorate in March 1966 and became a research chemist in the Analytical Division of Hercules, Inc., Wilmington, Del. In January, 1968, he joined Waters Associates as a senior research chemist. He held National Science Foundation Summer Fellowships during the summers of 1963 and 1964. From September 1964 through March 1966 he held a National Institutes of Health Fellowship. Professor David N. Hume was his supervisor.

Congratulations to *Robert I. Mason,* S.B. V 1943, on his appointment as Vice President for Marketing at Haveg Industries, Inc., a subsidiary of the Hercules Company of Wilmington, Del. Graduate study was at a low in 1943 when Bob joined Hercules. He was granted leave in June 1944 to serve in the U.S. Navy and has been with the company since his discharge from the service.

His brother, Howard S. Mason, S.B. V 1935, has been associated with the University of Oregon Medical School, Portland, Ore. since November 1952. Howard was awarded the S.M. degree in 1936, taught at Ruston Academy, Havana, Cuba 1936-1937, was awarded the doctorate at M.I.T. in 1939, and joined the staff of the National Institutes of Health where he published 30 papers on research. In 1948 he was awarded a National Cancer Special Fellowship for study at Cambridge, England. Howard's interest was in Medical Research. His thesis was directed by Professor J. W. M. Bunker (Biology) and Dr. Nicholas Milas (Chemistry).

Robert B. Mosely has been named Assistant Chief Research Technologist at Shell Oil Manufacturing Laboratory, Houston, Texas. Dr. Mosley was awarded the Ph.B. Degree (equivalent to the B.S. degree—no longer given) at the University of Chicago in June 1948, and the Ph.D. degree in organic chemistry at M.I.T. in 1952. Comments in our file, dated 1952, mention his specialties as reaction kinetics and spectra. His research was supervised by Assistant Professor C. Gardner Swain. His thesis committee: Arthur C. Cope, John Roberts, Walter Stockmayer, and Lockhart B. Rogers. He was the Atomic Energy Predoctoral Fellow for the year 1951-1952.

John T. Nolan, Ph.D. in organic chemistry in June of 1955, has been promoted to Assistant Supervisor of the Petroleum Process Research Section of the Texaco Research Center, Beacon, N.Y., and John Nolan, who was awarded the A.B. degree at the Catholic University of America, Washington, D.C., in 1951, has been with Texaco since he completed the requirements for the doctorate at M.I.T.

Charles P. Priesing has recently been appointed Supervisor of Environmental Engineering at American Cyanamid, Wayne, N.J. Dr. Priesing was awarded the doctorate in organic chemistry in June 1957. He graduated from Merrimack College, Andover, Mass. (B.S. 1952) and a member of the first senior class at Merrimack, which was established as a four-year college in 1948. His research at M.I.T. was directed by Dr. Nicholas Milas; subject: vitamin synthesis.

George J. Thomas Jr., B.S. 1963, Boston College, completed his requirements for the doctorate in physical chemistry in January of 1967 and was awarded a National Institutes of Health Postdoctoral Fellowship to study at King's College in London, England with Professor M. H. Wilkinson. In the fall of 1968 he accepted an assistant professorship in chemistry at the Southeastern Massachusetts Technological Institute, located in South Dartmouth, Mass. Dr. Thomas had a great capacity for hard work and a determination to succeed. The staff at Saint Elizabeth's Hospital, Brighton, remember him as the night emergency x-ray technician, for board, room and a small salary, while he was a full-time student at Boston College. At M.I.T. he served as a teaching assistant and as an N.I.H. Predoctoral Fellow. His research was directed by Professor Richard C. Lord.—*L. F. Hamilton,* Correspondent, M.I.T., Room 4-254, Cambridge, Mass. 02139

VI

Samuel Labate, S.M.'48, has been elected President and Chief Executive Officer of Bolt, Beranek and Newman, Inc., effective July 1, 1969. These positions are now held by Dr. Leo L. Beranek, Lecturer at M.I.T., who will become Chief Scientist of the company. Mr. Labate entered M.I.T. for graduate study in acoustics under the guidance of Dr. R. H. Bolt who was at that time Director of M.I.T.'s Acoustics Laboratory, and Labate was the first M.I.T. student to be awarded the S.M. degree in acoustics. He joined the Bolt and Beranek partnership upon graduation in 1948. After Professor Robert B. Newman (Master in Architecture, M.I.T.'49) joined the company, the Bolt, Beranek and Newman partnership was formed in 1950, Mr. Labate becoming a partner in 1952. The incorporation in 1953 resulted in BBN, Inc., of which Mr. Labate is now Executive Vice President. Before coming to M.I.T. he received the A.B. degree at Lafayette College in 1940 with a major in mathematics, did some teaching and graduate study in other colleges, and served three years in the Signal Corps.

Paul L. Penfield, Jr., Sc.D.'60, has been elected Secretary-Treasurer of the Boston Section, I.E.E.E., effective June 1, 1969. This position places him on the Executive Committee on which he held earlier membership in 1965-1966. Now Associate Professor of Electrical Engineering at M.I.T., he is promoted to Professor, effective July 1, 1969. Author of several scientific papers and three books, his interests include solid-state applications to microwaves, conservation theorems for physical systems including plasmas and electron beams, and noise theory and thermodynamics of nonlinear systems. His most recent book *The Electrodynamics of Moving Media* was co-authored with Professor Hermann A. Haus, Sc.D.'54. He has recently had fun with correspondence published in the Proceedings, I.E.E.E., on a paradox in which the second law of thermodynamics is apparently violated by the customary model for a DC motor. Professor Penfield has held Ford Foundation Postdoctoral Fellowships and a National Science Foundation Senior Postdoctoral Fellowship. In 1966-67 he was an Academic Visitor at Imperial College of Science and Technology in London. He is currently Consultant to Varian Associates of Beverly, Mass., in the field of solid-state microwaves, and is involved in the planning of the M.I.T. Electrical Engineering Department's new building to be occupied about three years hence. His undergraduate work was done at Amherst College where he majored in physics, receiving the A.B. degree in 1955.

Henry A. Sandmeier, S.M.'52, E.E.'54, has recently returned from Europe where he lectured on the physics and technology of nuclear explosions. The week of September 23, 1968 was spent at the Swedish National Institute of Defense in Stockholm where he lectured on nuclear weapons effects, essentially deep penetration calculations of neutrons and photons into matter, and the electromagnetic pulse. He was Visiting Professor in Professor Hocker's Institute of Nuclear Energy at the University of Stuttgart, Germany during the winter semester, October 15, 1968 to February 15, 1969. Here he gave a course of lectures for students and staff on the production of neutrons and photons in a nuclear explosion, their transmission through matter, and shielding. He also conducted two



A. I. Grayzel, VI



J. M. Osborne, '62



T. V. Griffiths, '57



A. B. Burns, '62

seminars in nuclear energy stressing calculations on a control data computer CDC6600. Dr. Sandmeier's experience on this type of computer in Los Alamos was particularly useful since the University of Stuttgart was about to acquire one of these machines. Consultation periods were held two afternoons a week for students and staff members. Mrs. Sandmeier and the two children accompanied him on this visit. Dr. Sandmeier is Physicist, theoretical division of the Los Alamos Scientific Laboratory of the University of California in Los Alamos, N.M. He was Visiting Professor of Nuclear Engineering at Purdue University 1966-67. He received the D.Sc. degree in electrical engineering at the Swiss Federal Institute of Technology in 1954 and the Ph.D. degree in physics in 1959.

Alfred I. Grayzel, S.M. and E.E.'61, Ph.D.'63, attended the International Microwave Symposium (Microwave Theory and Techniques Group of I.E.E.E.) May 5-8 in Dallas, Texas, where he presented a paper "A New Technique for Designing Highly Stable High-Efficiency Varactor Multiple Chains" by Grayzel and Minkoff. Dr. Grayzel directs a program in solid-state microwave power generation at N.A.S.A.'s Electronics Research Center in Cambridge. Following his graduate study program, he worked on the design of experimental satellites at M.I.T.'s Lincoln Laboratory where he still maintains a consulting connection. He received the B.A. degree from Columbia College in 1954 and the B.S. degree from the Columbia University School of Engineering in 1955.—*Karl L. Wildes,* Correspondent, Room 10-303A, M.I.T., Cambridge, Mass. 02139

Sloan

Thomas V. Griffiths, '57, has been elected Vice President-Manufacturing and Technical of BP Oil Corporation, the principal U.S. subsidiary of British Petroleum. . . . *A. Bruce Burns,* '62, is now Vice President-Production of Union Carbide Corporation's Chemicals and Plastics Division. Mr. Burns joined Union Carbide in 1942 as a production engineer at the corporation's chemicals plant in South Charleston, W. Va. He continued in the chemicals area of Union Carbide's business, moving up to the positions of plant manager at Whiting, Inc., in 1964 and at Institute, W. Va., in 1966. In his new post, Mr. Burns will be located in the New York office. . . . *Dura W. Sweeney,* '63, has been promoted to I.B.M. Director of Service at the company's corporate headquarters in Armonk, N.Y.

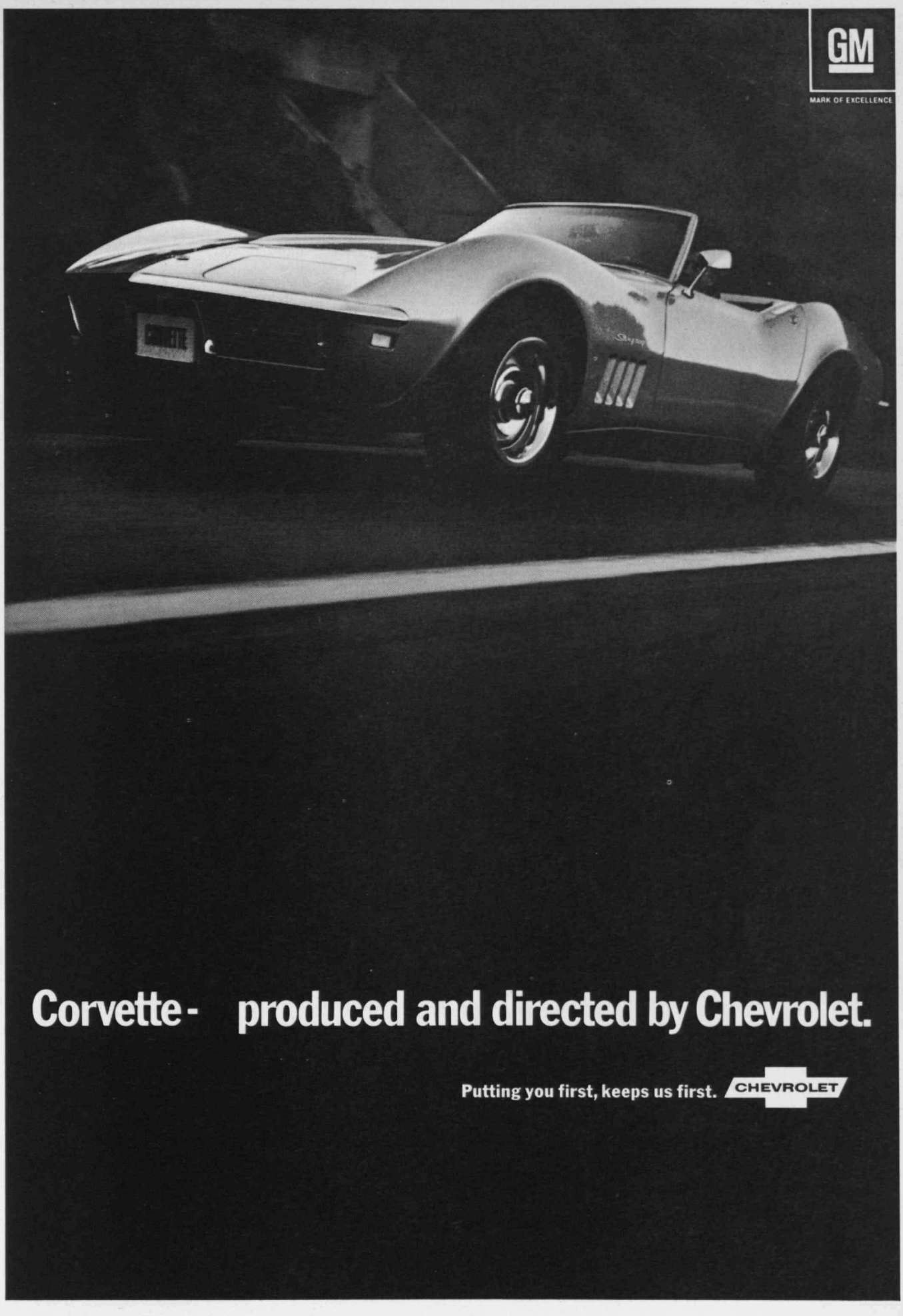
James M. Osborne, '62, has been appointed manager of marketing activity for R.C.A.'s Defense Communications Systems Division, Camden, N.J. He also continues as Manager, Secure Communications Programs for R.C.A. DEP. . . . *Richard J. Howe,* '65, Assistant Manager, East Texas Division, Humble Oil & Refining, Houston, Texas, addressed the Los Angeles Petroleum Forum on the industry's rapid expansion in world wide offshore operations. . . . *Philip A. Piro,* '64, has been appointed General Manager of the R.C.A. Missile and Surface Radar Division, Morrestown, N.J. He will be responsible for overall management and operations of the R.C.A. division developing advanced radar systems for the military services and N.A.S.A. Since 1965, Mr. Piro had been Manager of R.C.A. Electromagnetic and Aviation Systems division at Van Nuys, California.

A zippy article in *Marketing/Communications,* February 1969, described *Bill Kay,* '63, as ". . . the kind of guy who might think of singing 'Nearer My God to Thee' at the end of a losing proxy fight, or would just as soon appear naked in the street as with suit coat unbuttoned." He moved from Vice President-Marketing and Director of Pepperidge Farms, Inc., to President, Rival Pet Foods in 1967. After drawing up Rival's first five-year plan," said the article, "Kay found the company was well into the third year by the end of the first." . . . *W. S. White, Jr.,* '58, is now Vice President of Appalachian Power Company and is slated to become Executive Vice President later this year. . . . *R. D. Blythe,* '66, formerly general traffic manager of South Central Bell Telephone Co., has become plant manager.

Thomas J. Vincent, '68, Corporate Director of Operations of Fairchild Hiller, Corp., has been elected Vice President and a member of the Board of Directors of Fairmicco, Inc. He has also been named Acting General Manager of the company. Fairmicco was established last year by Fairchild Hiller and Washington's Model Inner-City Community Organization as a means of fighting hard-core unemployment and enabling members of the Shaw area to become managers and owners of a commercial manufacturing enterprise. The company manufactures wooden pallets, ammunition boxes, door frames, and electrical cables.

C. W. King, '59, is one of the developers of individually powered electric wheels that give a vehicle exceptional mobility and steering flexibility. The developers say: "Power can be fed to all wheels, or any combination of them by a series of toggle switches on the instrument panel; there is an 'infinitely variable' electric transmission and consequently no shifting of gears; and in rugged roadless areas, this permits a continuous flow of power, improving both maneuverability and control."

T. A. Wilson, '53, President of Boeing Co., has replaced William M. Allen, Chairman, as chief executive officer. Mr. Wilson has also been named a Director of the Seattle First National Bank. . . . *K. F. Holtby,* '62, is now Vice President of Boeing. . . . Allen L. Hatch, Jr., '54, has been named Vice President of Asarco, the largest domestic smelter and refiner of metal ores. He will continue as manager of the ore department.



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